REVIEW ARTICLE

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Analysis of peri-implant tissue post-implantation using periapical radiograph: a scoping review

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ABSTRACT

Objectives: This review article is aimed to review various studies evaluating changes in peri-implant height and bone density post-implantation using periapical radiographs.

Review: This scoping review was carried out according to Preferred Reporting Items for Systematic Review and Meta-analysis for Scoping Review (PRISMA-Scr) by reviewing literatures related to the evaluation of peri-implant bone post-implantation using periapical radiographs. PRISMA-ScR is a guide for writing a scoping review to increase the relevance and transparency of methodological and research findings. Literature searches were performed on PubMed NCBI, Science Direct, EBSCOHost, and Clinicalkey databases with the keywords "((dental implant) AND (periapical radiograph)) AND (peri-implant) OR (alveolar bone))". Literature screening was carried out based on the predetermined inclusion and exclusion criteria that have been set in journals published in 2016-2020. A total of 18 eligible studies were included in this study. The data from the included studies was then synthesized, and the literatures were reviewed.

Conclusion: Peri-implant bone generally experiences a decrease in height (marginal bone loss) and an increase in density during the process of bone adaptation to functional loading. The design and placement techniques of the implants have an impact on the extent of the change in bone height.

Keywords: *Dental implant, peri-implant, alveolar bone, periapical radiograph*
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INTRODUCTION

Dentures are commonly used as the treatment of restoring missing teeth.[1] One of the denture options that are currently quite popular for use and receive a lot of attention is dental implant. The increase in the use of dental implants is due to the fact that treatment using dental implants can maintain the structure of the teeth and surrounding bone, reduce the risk of caries and periodontal disease, reduce the risk of failure of rehabilitative treatment either caused by caries or endodontic treatment, and improve esthetics.[2,3] Another advantage of using dental implants is in terms of cost and easy maintenance.[4]

The tissue surrounding the dental implant is referred to as the peri-implant tissue, which consists of soft tissue (mucosa) and hard tissue (bone).[5] Peri-implant bone will begin the healing process after surgical implant placement in the endosteal area.[6] The healing process is generally divided into 3 phases, the inflammatory phase, the proliferative phase and the maturation or remodeling phase.[6] Soon after the surgical implantation process, the implant surrounding bone will begin to heal through intramembranous ossification.[6,7] Peri-implant bone will begin to remodel one month after implantation by adapting to functional loading, which results in increase of bone density. Mechanical loading supports the formation of high bone density during remodeling and soft tissue development during the healing process.[7] Functional loads that exceed the implant's capacity will cause biological failure characterized by bone loss around the implant.[8]

Dental implant procedures often result in suboptimal treatment and show complications that can be caused by improper use and orientation of implants.[9] Factors that influence implant failure include patients with diabetes or AIDS, heavy smoking, radiation exposure, and osteoporosis.[10] The most common complications of dental implant treatment are peri-mucositis and peri-implantitis.[11] Radiographic examination for dental implant treatment can be performed using intra-oral radiography (periapical and occlusal), extra-oral radiography (panoramic and lateral cephalometry), and modern imaging techniques such as Digital/Computed Radiography (DR), Computed Tomography (CT), and Cone Beam Computed

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Tomography (CBCT).[9,12] Radiographic examination of implant treatment is required at the pre-operative, intrasurgical, and post-operative evaluation stages.[12] Post-implant imaging is used to evaluate peri-implant tissue by periodically assessing alveolar bone changes.[13] Radiographic evaluation also serves to evaluate the attachment of implant to the bone and the changes in mineralization or bone volume.[12]

Currently, modern radiographic technology has been widely developed and can provide a three-dimensional image of bone, but modern radiographic imaging devices such as CT, DR, and Magnetic Resonance Imaging (MRI) are not commonly available in Indonesia.[9] Disadvantages of digital radiograph are the sensors that are thicker and not as flexible as dental films that may cause patient discomfort and limited positioning of the sensor intraorally. Digital sensors are also smaller than standard film, resulting in a smaller image area.[14] Another reasons why modern imaging systems aren't the first choice are because of concerns about radiation exposure and cost. This causes conventional radiographic techniques such as periapical and panoramic radiographs to remain the main choice in the examination and evaluation of implant treatment.[15] A total of 44.44% of practitioners used periapical radiographs, 94.44% used panoramic radiographs, and 38.89% used both periapical and panoramic radiography techniques in evaluating implants based on a survey conducted on 18 dental implant practitioners in Jakarta.[16]

Periapical radiography is a commonly used in implant treatment. Intraoral radiography is recommended for the assessment of the level of marginal bone around the implant because it can detect significant changes in the peri-implant trabecular.[16] Radiographs are needed in implant treatment to assess bone structure and condition both quantitatively and quantitatively.[9] Qualitative analysis includes assessment of trabecular density and pattern, while quantitative analysis includes assessment of alveolar bone height. Radiographic analysis can be done with the help of various software. The use of digital radiography can help adjust the brightness and darkness of the radiograph and optimize image contrast and brightness for procedures such as caries detection and bone level assessment.[17] The use of periapical radiographs can provide clearer and more accurate information and images regarding the number and pattern of trabecular bone structures compared to panoramic radiographs.[18] The image produced by periapical radiographs has a lower distortion rate than panoramic radiographs. Parallel periapical radiography technique has a distortion rate below 10%.[9] Periapical radiographs have a fairly low effective dose value, ie 1-8.3 Sv (0.001-0.0083 mSv).[14] Periapical radiographs are also easily and quickly performed, are generally available, and allow objective comparative measurements to be made over time.[19]

Various factors can increase or inhibit osseointegration, including implant-related factors such as implant design and chemical composition, implant surface topography, material, shape, length, diameter, and the use of coatings on the implant.[20] The first radiographic examination should be performed after the prosthesis is placed and subsequent examinations performed 6-12 months after implant placement at 2-3 year intervals.[21] Peri-implant bone remodeling can take several years until most of the woven bone and old bone from primary bone contacts are replaced by new bone.[22] Currently, there have been many studies related to the evaluation of peri-implant tissue post-implantation using periapical radiographs, but there has not been many review studies related to this. This study is a descriptive study conducted using scoping review method. This study aims to review various studies evaluating changes in peri-implant height and bone density post-implantation using periapical radiographs.

REVIEW

This study is a descriptive research using the scoping review method. To strengthen the relevance and transparency of methodological and research findings, this study used the scoping review approach based on the PRISMA Extension for Scoping Reviews (PRISMA-ScR). The PRISMA-ScR Guidelines specify 20 major reporting categories and two optional reporting items that should be included in the scoping review report.[24] The study was conducted online from September 2020 to April 2021.

LITERATURE SEARCH STRATEGY

The search in this study was conduction using "Boolean Operators", which is an article search method by combining two or more words using "AND", "OR", and "NOT".[24] The literature search was carried out on the PubMed NCBI, Science Direct, EBSCOHost, and Clinicalkey databases with the keywords "((dental implant) AND (periapical radiograph)) AND (peri-implant) OR (alveolar bone))

INCLUSION AND EXCLUSION CRITERIA

Literature screening was based on predetermined inclusion and exclusion criteria. The inclusion criteria used in the literature search in this study were as follows: Clinical trial and/or systematic review articles discussing the radiographic evaluation of peri-implant hard tissue using periapical radiographs, Articles with study samples without systemic conditions and bad habits, such as smoking, implant treatment evaluation period from minimal 6 months to 5 years , articles in English, Articles available in full-text form, and Articles published in 2016-2020. While the exclusion criteria used are as follows: Narrative review and Case Report. Only clinical research was included in this study, hence narrative review was not included. Case reports were excluded because of the lower level of scientific evidence and to limit the subjectivity of the research subjects.

DATA SYNTHESIS AND EXTRACTION

After that, the screened literature was processed in compliance with the research inclusion criteria. The results and findings from each article are combined in a data synthesis. The author's name, year of publication, kind of study design, nation, Q level, periapical radiograph characteristics, implant type, length of evaluation period, and X-ray results were all extracted from each article. In addition, to draw conclusions, an examination and comparison of the contents of the literatures is carried out.

SELECTED STUDIES

528 articles were found at the initial search stage based on the search results in the four databases using predetermined keywords. Furthermore, duplication checks were carried out, and resulted 118 duplications in the four databases. The screening phase resulted in 18 studies that met all of the inclusion criteria and were included in this review. The study selection process according to the PRISMA protocol can be seen in Chart 1.

The studies included in this review consisted of prospective studies, controlled clinical trial, randomized clinical trial, and retrospective studies. Of the 18 included studies, there were 16 studies that evaluated peri-implant bone height, 1 study that evaluated peri-implant bone density, and 1 study that evaluated both. Based on the year of publication, 8 studies were published in 2016, 3 studies were published in 2017, 1 study was published in 2018, 5 studies were published in 2019, and 1 study were published in 2020 Based on the Scopus index, the journals included in this review consist of 6 Q1 journal articles, 9 Q2 journal articles, and 2 Q3 journal articles.

The characteristics of the selected articles are shown in Table 1. In all reviewed studies, implant evaluation was performed using periapical radiographs with the aid of software. Various implants with various brands, materials, and designs are evaluated with an evaluation period of 6 months to 5 years. The results of data extraction and synthesis from selected articles can be seen in Table 2.

DISCUSSION

Peri-implant bone is the bone that surrounds and is expected to form an integration with the implant, known as osseointegration.[5] Osseointegration radiographically can be seen through direct contact between the implant and the peri-implant bone. A radiolucent appearance around the implant is indicative of the presence of fibrous tissue between the bone and the implant.[44] An implant is considered unsuccessful if osseointegration is not achieved, there is clinical movement, normal use is uncomfortable, or there is peri-implant radiolucency due to infection.[45] During peri-implant attachment development, bone healing and remodeling cause early peri-implant bone loss. Maintaining implant stability necessitates the integration of supporting tissue

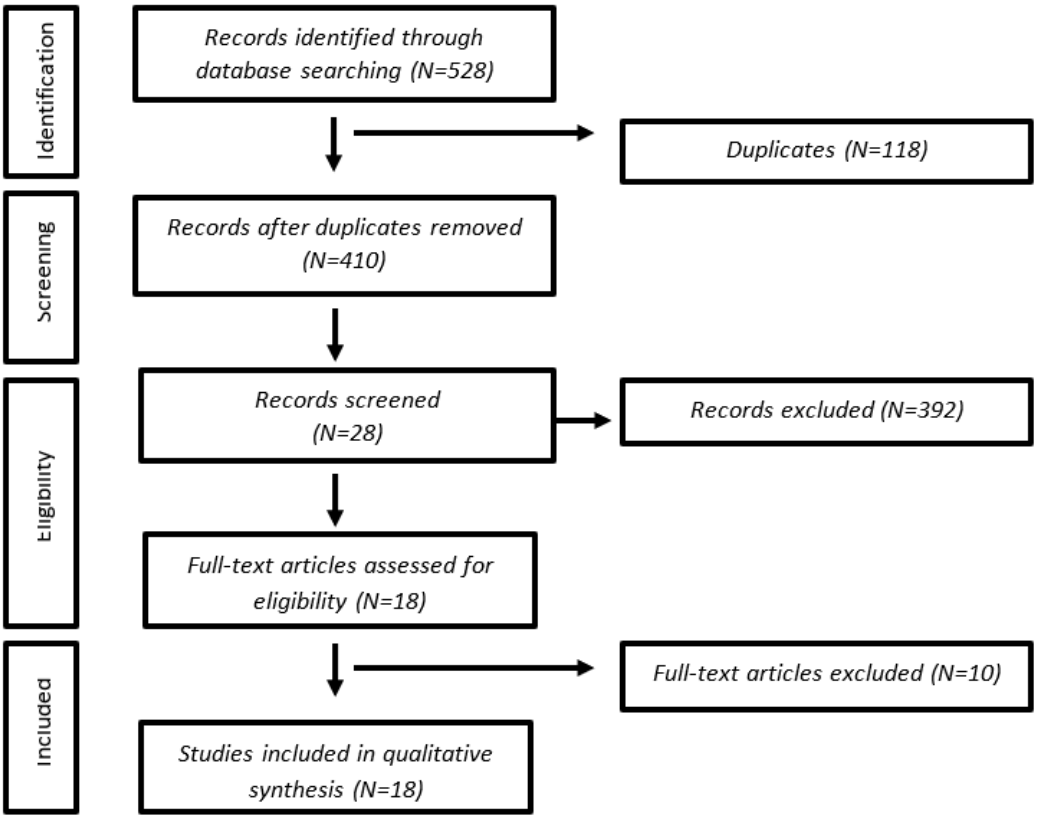

Figure 1. Study selection process

Table 1. Characteristics of included study

NO.	AUTHOR	YEAR OF PUBLICATION	STUDY DESIGN	COUNTRY	Q	REFERENCE NUMBER
1	Arun Ramachandran et al.	2016	Prospective longitudinal study	India	Q1	[25]
2	Gerardo Mendoza-Azpur et al.	2016	Controlled clinical trial	Peru	Q2	[26]
3	M. De Francesco et al.	2016	Prospective pilot clinical study	Italy	Q2	[27]
4	Michele Cassetta et al.	2016	Prospective cohort study	Italy	Q2	[28]
5	Secil Karakoca Nemli et al.	2016	Prospective study	Turkey	Q3	[29]
6	Michele Cassetta et al,	2016	Prospective study	Italy	Q1	[30]
7	Maximilian Moergel et al.	2016	Prospective two-center observational study	German & Portugal	Q1	[31]
8	Ko-Ning Ho et al.	2016	Retrospective case study	Taiwan	Q2	[32]
9	Laura Lago et al.	2017	Clinical prospective study	Spain	Q1	[33]
10	Maria Cecília Giacomel et al.	2017	Randomized clinical trial	Brazil	Q1	[34]
11	Eisner Salamanca et al.	2017	Retrospective clinical study	Taiwan	Q2	[35]
12	Claudio Gatti et al.	2018	A prospective multicenter study	Italy	Q1	[36]
13	Mayla Kezy Silva Teixeira et al.	2019	Clinical research	Brazil	Q2	[37]
14	Shaifulizan Ab Rahman et al.	2019	Prospective observational study	Malaysia	Q3	[38]
15	Rosa-María Díaz-Sánchez et al.	2019	Randomized prospective clinical trial	Spain	Q2	[39]
16	Laura Lago et al.	2019	A Randomized, Controlled, Split-Mouth Trial with	Spain	Q1	[40]
17	Yu Hwa Pan et al	2019	Retrospective radiographic study	Taiwan	Q2	[41]
18	Daycelí Estévez-Pérez et al.	2020	Retrospective clinical trial	Spain	Q2	[42]

and bone.[20] Bone loss around the implant is an important variable that should be evaluated post-implantation.[22] Examination using periapical radiographs is a generally accepted method for assessing the long-term evaluation of these changes. the interproximal crest of the implant.[20]

The peri-implant bone image is expected to show direct contact between the peri-implant hard tissue (bone) and the implant surface, as well as a stable level of bone height.[43] There are two kinds of implant stability, namely primary stability related to the attachment of the implant to the peri-bone bone at early implant placement and secondary stability achieved through bone regeneration and remodeling.[45] Biological factors that influence the success of osseointegration consist of the state of the implant recipient's bone and its healing ability, while biomechanical factors can generally be divided into host-related factors and implant-related factors. Host related factors consist of bone density and its ability to accept loads, post-extraction bone availability, and parafunctional habits. Implant-related factors include implant design, implant chemical and biomaterial composition and its biocompatibility, and implant surface topography.[46]

Previous findings showed that radiologically peri-implant bone loss was within the acceptable range. The criteria set by Albrektsson et al are the criteria commonly used to assess the success of implant treatment. The decrease in bone height around the implant in the first year is a maximum of 1.5 mm and a maximum of 0.2 mm of continuous bone loss per year.[29,41,47,48] A study conducted by M. De Francesco et al in 2016 evaluated single tantalum implants clinically and radiographically. The findings in this study showed bone loss on the mesial side of 0.96 mm and 0.82 mm on the distal side. The study also found that the greatest marginal bone resorption occurred 6 months postoperatively after one functional year, but there was no statistically significant difference between the marginal bone level after 6 months and 12 months indicating that the marginal bone resorption was a physiological process.[27]

Another study conducted by Secil Karakoca

Table 2. Characteristics of articles included in inclusion criteria

PERIAPICAL RADIOGRAPHIC CHARACTERISTICS	IMPLANT CHARACTERISTICS	EVALUATION TIME	BONE HEIGHT EVALUATION	BONE DENSITY EVALUATION	X-RAY RESULTS
Software: GNU Image Modulation Program	Implant brand: Dentin implants	6 months	N/A	✓	There was a decrease in the grayscale level in the crestal bone in the first 3 months and an increase in the grayscale value from the 3rd to 6th month
Software: ImageJ software	Implant design: Short implant Surface type: Sandblasted, acid-etched	12 months	✓	N/A	There was a greater marginal bone loss rate in short implants compared to standard sized implants, especially on evaluation after 12 functional months
N/A	Implant brand: Tantalum dental implants Implant materials: Carbon, tantalum, and titanium alloy	12 months	✓	N/A	The greatest marginal bone resorption occurred 6 months postoperatively. Statistically, there was no significant difference between the marginal bone level after 6 months and 12 months
Software: VixWinPRO, Gendex	Implant material: Ti 6Al-4V alloy Implant design: Cylindrical with morse-taper connection Surface type: Modified sand-blasted, acid-etched	36 months	✓	N/A	Significant marginal bone loss was found in subcrestally placed implants, particularly in the maxilla, and in implants placed in patients over 50 years of age.
Software: ImageJ software	Implant brand: IDCAM dental implants Implant material: Ti6Al4V Grade 4 and 5 Implant design: Threaded, cylindrical, has a Morse-tapper connection, and a concave apex Surface type: Sandblasted, acid-etched. Implant coating: TiO2	24 months	✓	N/A	Mean marginal bone loss was 0.35±0.14 mm at the first 6-month evaluation, 0.47±0.15mm at the 6-12 month evaluation, and 0.58±0.16 mm at the 12-24 month evaluation after prosthetic placement. This finding is in accordance with Alberktson's criteria where the marginal bone level changes at year 1, which is <1.5 mm.
Software: VixWinPRO, Gendex	Implant material: Alloy Ti 6Al-4V Implant design: Morse-tapper connection Surface type: Modified sand-blasted, acid-etched	60 months	✓	N/A	Marginal bone loss was significantly higher in the maxilla only with wide-diameter implants or those inserted subcrestally. Marginal bone loss was also significantly higher in the incisor and canine regions.
Software: ImageJ software	Implant brand: Colnega screw-line implants Implant design: Conical tapered platform-switched Surface type: Abrasive-blasted, acid-etched	12 months	✓	N/A	Implants placed subcrestalally showed a greater degree of bone loss than those placed supracrestalally or epicrestally, especially in the mesial bone.
kV: 60 mA: 6 Time: 0,4s (regio premolar) dan 0,64s (regio molar) Software: EZ-Dental professional image recombination software	Implant brands: Nonsubmerged ITI implants and Xive submerged implants Implant design: Stepped screw with internal hexagon Implant coating: Hydroxyapatite	6 months	✓	N/A	Submerged implants showed a higher rate of marginal bone resorption and bone-implant contact than non-submerged implants, but both types of implants still showed good bone loss, which was below 0.5mm in both implants.

(Cont.) Table 2. Characteristics of articles included in inclusion criteria

PERIAPICAL RADIOGRAPHIC CHARACTERISTICS	IMPLANT CHARACTERISTICS	EVALUATION TIME	BONE HEIGHT EVALUATION	BONE DENSITY EVALUATION	X-RAY RESULTS
kV: 70 **mA: 7** **Software: NIH ImageJ software**	Implant design: Platform switching	60 months	✓	N/A	After 5 years of follow-up, the mean marginal bone loss was -0.28 ± 0.45 mm. The difference in mean values between the three intervals studied (at baseline radiography, after 1 year, and after 5 years) increased with time.
Software: Cliniview 10.2.2 software	Implant brand: SW Morse implants	9 months	✓	N/A	Evaluation at month ninth showed a higher rate of marginal bone loss in the delayed loaded submerged implant group than in the other two groups. Overall, all three implant placement procedures demonstrated a marginal bone loss rate below 1.5 mm.
Software: EZ-Dental professional imaging software	Implant brand: Dentium implant Implant design: Platform matching and platform switching Surface type: Sandblasted, acid-etched	12 months	✓	N/A	There wass greater bone gain in implants with a platform switching design than with platform matching. Statistically, a significant difference was seen in the vertical addition of bone.
Software: ImageJ software	Implant brand: Osstem TSIII Implant design: Morse-tapper connection and hexagon external connection	12 months	✓	N/A	The subcrestal group showed a greater rate of bone loss at 1 year follow-up compared to the crestal group. Greater bone loss occurs in the first 3 months after implant placement. Bone loss found is still considered physiological.
Resolution: DFL Contrast DV-54 size 0 (22 x 35 mm) **kV: 70** **mA: 10** **Time: 0,5s** **Software: Emago v.5.0.12 software dan ImageJ software**	Implant brands: Titamax Cortical MT and Titamax Cortical Ti	12 months	✓	✓	There was no significant difference in the evaluation of alveolar bone density in the implant groups with Morse tapper and external hexagon connection designs. Differences in the rate of marginal bone loss between the two implant groups were seen after 3 months, whereas the rate of bone loss was greater in implants with external hexagon connections.
Software: Planmeca Romexis® software	N/A	6 months	✓	N/A	Radiographic examination at 6 functional months showed mesial bone loss of 0.786 mm and distal bone loss of 0.8 mm. There was no significant difference in the rate of marginal bone loss between the maxillary and mandibular implants and the single-tooth implant prosthesis and the 3-unit bridge.

(Cont.) Table 2. Characteristics of articles included in inclusion criteria

PERIAPICAL RADIOGRAPHIC CHARACTERISTICS	IMPLANT CHARACTERISTICS	EVALUATION TIME	BONE HEIGHT EVALUATION	BONE DENSITY EVALUATION	X-RAY RESULTS
N/A	Implant brands: The BEGO Semados® S implants, the BEGO Semados RI ® implants, the BEGO Semados Rs ®,, the BEGO Semados RSX ® Surface type: TiPurePlus surface (aluminum oxide sandblasting, acid-etching)	12 bulan	✓	N/A	Marginal bone levels were similar in all four implant groups, with the RI, S, and RSX implant groups marginal bone loss of 0.14 and 0.12 in the RS implant group. Statistically, no significant differences were found between groups.
Software: NIH ImageJ software	Implant design: platform matching and platform switching	36 bulan	✓	N/A	Significant changes in the level of crestal bone height were only seen in the platform matching implant group on evaluation between insertion and after 3 years. There was no statistically significant difference at 3 years of follow-up in the two implant groups.
Software: EZ-Dental professional imaging software	Implant brands: Implantium®, Xive® Implant Implant design: Switching platform with internal connection Surface type: sandblasted, acid-etched	36 bulan	✓	N/A	Both implant groups (Platform Switching and Platform Matching) showed an increase in mean bone both vertically and horizontally over the 36-month study period. PS implants showed a greater and statistically significant increase in vertical marginal bone addition.
Software: CAD software	Implant brand: Straumann® Standard Plus Implant Implant design: Extra-short, short, and conventional sized implants	36 bulan	✓	N/A	Bone loss around the more anteriorly placed implants was similar in the three groups, whereas in the more posteriorly placed implants, a significantly lower rate of bone loss was found in the conventional length implant group compared to the short and extra short implants. Especially in the posterior position, implants of conventional length tend to have no marginal bone loss at all.

Nemlio et al in 2016 showed that the mean marginal bone loss in IDCAM implants was 0.35± 0.14 mm at the first 6-month evaluation, 0.47± 0.15mm at the 6-12 month evaluation, and 0.58± 0.16 mm on evaluation 12-24 months after insertion of the prosthetic. The above findings indicate that the implant experienced marginal bone loss, but still below the maximum acceptable standard. This standard is in accordance with the Alberktsson criteria where the marginal bone level change at year 1 is below 1.5 mm.[29]

Periapical radiography is a commonly used modality for the long-term evaluation of changes in the interproximal crest bone around the implant.[19] In the article included in this review, evaluation of bone height was performed using periapical radiography by comparing the height of the crestal bone on the reference radiograph compared to that of the time. follow-up. The implant neck is the reference point for the assessment of vertical and horizontal bone dimensions.[35] The radiographic bone height measurement is measured from the implant neck to the first bone-implant contact.[33]

A wide variety of dental implant designs have been invented in recent years. There are changes in the alveolar bone in the area under functional stress in different implant designs.[32] The implant design also affects the stability of the implant after surgery, during the osseointegration process, and during loading time.[39] The results of a literature search found that implant length affects the degree of bone loss. Study conducted by Gerardo Mendoza -Azpur et al in 2016 found a greater rate of bone loss in short-sized implants compared to standard-sized implants.[26] Similar results were found in a study conducted by Daycelí Estévez-Pérez.[42]

The results of the literature search also show that the type of implant design affects the state of the bone after implant placement. Eisner Salamanca et al in 2017 compared the evaluation of the marginal bone level in implants with platform switching and platform matching designs. The results showed that both implant designs experienced an increase in bone height which could be evaluated by decreasing the distance between the implant neck and bone. Greater bone additions were found in the design of switching platform implants compared to platform matching.[35] Similar findings were found in a study conducted by Yu Hwa Pan et al in 2019.[41] A study conducted by Laura Lago et al found that there was a significant increase in crestal bone height that was only seen in the platform matching implant group on evaluation between initial insertion and after 3 years of insertion.[40] The results of a study conducted by Mayla Kezy Silva Teixeira et al in 2019 found that the rate of bone loss was greater in implants with hexagon external connections were compared with Morse connections at a 3-month evaluation.[37]

The depth of implant placement significantly affects the remodeling process. The results of a study by Claudio Gatti et al in 2018 showed that the subcrestally placed implant group showed a greater rate of bone loss at 1 year follow-up compared to the crestally placed implant.[36] This finding is similar to that of Maximillian et al.'s study where subketal implants showed a greater rate of bone loss than supracrestal or epicrestal implants, especially in the mesial bone.[31] A study conducted by Michele Cassetta et al in 2016 revealed that significant marginal bone loss was found in subcrestally placed implants, particularly in the maxilla.[28] Similar results were found in a follow-up study also conducted by Michelle Casetta et al in 2016.[30]

Bone density describes the amount of bone tissue in a given volume of bone. Bone density is directly proportional to the stability of the primary implant. Radiographic features were used as a parameter to assess the density of alveolar bone around dental implants.[49] The quantitative method of analyzing bone density on periapical radiographs is to measure gray levels and texture parameters. The higher the mean gray level on radiographs, the higher the bone density.[50]

Arun Ramachandran et al. in 2016 investigated changes in bone density in implants that were directly given a functional load and implants that were not directly given a functional load. Bone density assessment was carried out by assessing the grayscale pixel value at the apical lateral of the implant. The results showed that in the first 3 months there was a decrease in the level of density due to more concentric pressure on the crestal bone and the formation of woven bone which was weaker and unmineralized. Evaluation at 3 to 6 months showed an increase in bone density due to the shift from less mineralized woven bone to mineralized lamellar bone.[25]

CONCLUSION

The study findings showed that radiographically peri-implant bone experienced marginal bone loss at the early phase of implantation due to the functional load on the implant. Several factors including designs and the depth of implant placement affect the magnitude of bone loss. Moreover, peri-implant bone increased in density and was shown through the increased level of the grayscale pixel in follow-up radiographs.

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FOOTNOTES

All authors have no potential conflict of interest to declare for this article.

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