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Assessment of Periodontal and Peri-Implant Conditions in Subjects with Dental Implants: A Clinical Study in Palestinian Population

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Abstract

Objective: The aim of the present study was to clinically evaluate the peri-implant and periodontal status in subjects with dental implants.

Material and methods: Thirty-four subjects were evaluated for modified plaque index, modified bleeding index, probing depth and bleeding on probing at the site of dental implants. Similarly, the natural teeth were examined with respect to plaque index, gingival index, probing depth and bleeding on probing.

Results: No statistically significant differences were noted between plaque index (0.92±0.12) and modified plaque (0.87±0.06), or between gingival index (0.14±0.04) and modified bleeding index (0.12±0.07). However, probing depth and bleeding on probing values were more in implants than in teeth ($p<0.01$).

Conclusion: No difference was noted with regards to accumulation of plaque and marginal inflammation among natural teeth and dental implants. Whereas sub gingival inflammation was found to be more in dental implants than in teeth.

Key Words: Dental implants, plaque, bleeding

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Introduction

Tooth loss is commonly encountered during lifetime and its replacement is also a common practice. Previously, a missing tooth was usually replaced using dentures and bridges. Recently the dental implants (DI) have become a most popular option to rehabilitate lost teeth.[1]

An increased rate of success and predictability of the process, as well as relatively minimal complications are some of the reasons behind the popularity of DI treatment option.[2]As an option for replacing a single missing tooth, an implant is freestanding, which is not attached to adjacent teeth, hence, it is much convenient for maintaining. For individuals with multiple missing teeth, DI can opt support for a stable, healthy, and aesthetic fixed restorations. Perhaps the most significant influence of DI is that they can efficiently restore quality of life of an edentulous individual.[3]

Success of DI is frequently defined by survival of an implant. Among various issues, bleeding from peri-implant mucosa, infection, and pain are initial complications seen with DI. An implant that causes clinical symptoms such as continuous pain and mobility may be regarded as faulty. Although it is reported that DIs have an increased success rate some individuals experience their failure. Failure of a DI probably results from multifactorial process; failure of osseointegration during initial healing stage, infection of the peri-implant tissues, and breakage are the factors behind failure of DI.[4]

Periodontal status of individuals with missing teeth may affect the health of peri-implant tissues. Limited data is available with regards to assessment of relationship between periodontal and peri-implant tissues in partially edentulous individuals and DI.[5] Hence it is necessary to know the status of teeth and DI as the use of DI is becoming more frequent and popular among edentulous patients along with focus on various clinical parameters.

The objective of this study was to clinically assess the periodontal and peri-implant conditions in partially edentulous patients with dental implants.

Material and methods

The present study was carried out after obtaining clearance from the research and ethical committee at Al Quds University (106/REC/2020) and consent was obtained from all the participants.

Thirty-four individuals who were partially edentulous and those with implant-supported restorations since 12 months, participated in this study. Individuals with a history of taking any antibiotics or any periodontal treatment in the previous six months and individuals with need for antibiotic prophylaxis were excluded from this study. Exclusion criteria also concluded smokers, diabetes and pregnant females.

Clinical Examination

The following parameters were examined for each DI

- Modified Plaque Index[6]
- Modified Bleeding Index[6]
- Probing depth[7]
- Bleeding on probing[8]

The following parameters were examined for natural teeth

a. Plaque Index[9]
b. Gingival Index[10]
c. Probing Depth[11]
d. Bleeding on probing[12]

Evaluation was carried out on distal, buccal, mesial and lingual or palatal aspect of each DI and the remaining natural teeth.

Statistical analysis was carried out with stata v.12 (StataCorp LP, College Station, TX, USA). Descriptive statistics were performed for the scale variables. Wald test was used to evaluate the significance and the established level of significance was 5%.

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Results

The characteristics of the study subjects and the distribution of the implants according to location placed is represented in Table 1 and Graph 1 respectively. Table 2 shows the means and standard error for the different parameters. We did not observe any statistically significant difference between modified plaque index and plaque index or between modified bleeding index and gingival index. However, probing depths were found at higher levels in implants when compared with natural teeth ($p<0.01$). The mean percentage of bleeding sites was 24.9% and 49.7% for teeth and DI respectively.

We found that around 90% of teeth sites had probing depth between 1 and 3 mm. Whereas in implants, 55.3% of sites exhibited a probing depth between 1 and 3 mm, while 42.6% of sites were in of 4-6 mm range. The remaining 2.1% implant sites had probing depth of more than 6mm (Graph 2).

Table1:Characteristics of the Sample

Number of subjects	34
Male/Female ratio	12/22
Mean age (range)	49.41 (24-69)
Number of implants	54
Number of teeth	610
Mean number of implants per patient (range)	1.91 (1-3)
Mean number of teeth per patient (range)	17.52 (3-22)
Mean time (months) after implantation in months (Standard Error)	47.31 (SE=1.89)
Mean time (months) after prosthesis setting in months (Standard Error)	31.45 (SE=1.67)

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Graph 1: Site of implant placement

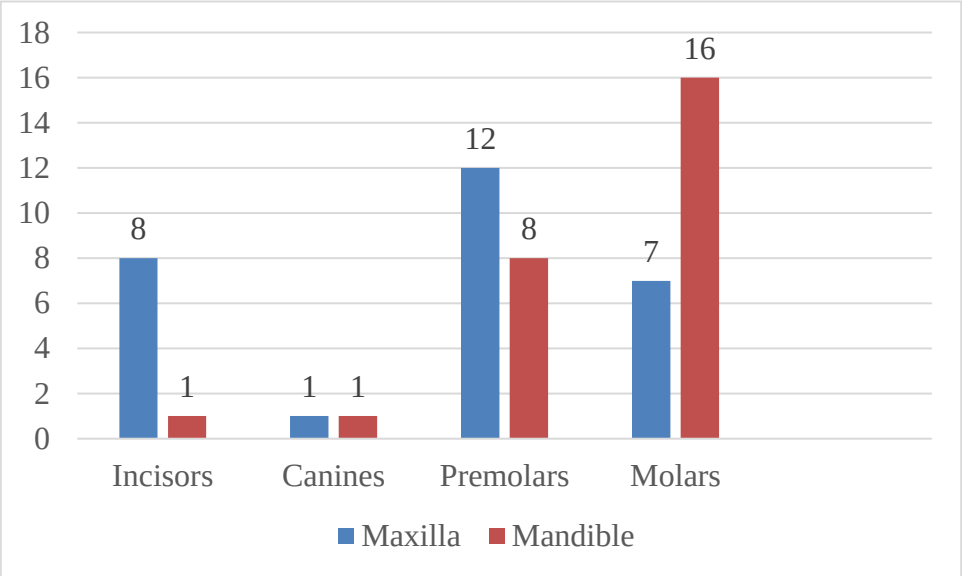
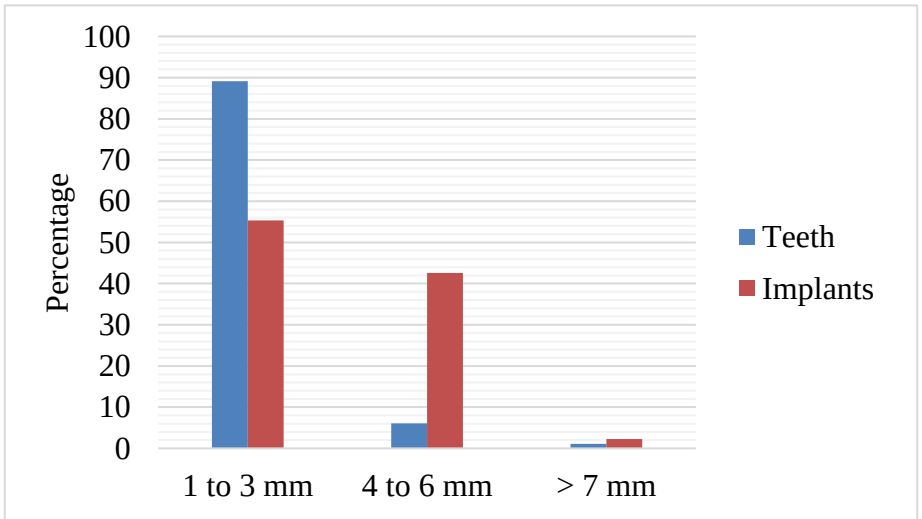


Table 2: Mean and Standard Error of clinical parameters evaluated in four locations per tooth/implant

Parameter	Teeth		Implants		
	Mean	Standard Error	Mean	Standard Error	p*
PlI/mPlI	0.92	0.12	0.87	0.06	0.61
GI/mBI	0.14	0.04	0.12	0.07	0.58
PD (mm)	2.31	0.14	3.41	0.16	0.01
Maximum PD (mm)	3.24	0.91	4.62	0.31	0.01
BOP (%)	24.9	1.9	49.7	2.9	0.01

Graph 2: Percent distribution of sites by probing depth in teeth and dental implants



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Discussion

Frequently, prognosis of DI is reported in terms of survival or failure rates. Although it is easy to precisely differentiate success from failure, it is not easy to describe and specify the intermediate stages in between. A radiolucency in the vicinity of peri-implant site and mobility are the common features of a failure, while DI in the verge of failure exhibits progressive marginal bone loss, clinical signs of peri-implant infection, without any signs ofmobility.[5]

The mean age of the participants in the study was 49.41 with an age range between 24-69 years. Most of the subjects were in the forty years of age. The duration after placing DI was 47.31 months and after the placement of the crown was 31.45 months. About two thirds of the individuals who volunteered to participate in this study were women. This was in accordance with most of the studies related to Dental speciality since females were known to aspire for dental treatment more often than males,consequently having more DI.[5,13,14]

The observations of the present study suggest a satisfactory periodontal and peri-implant conditions in the participants. With regards to the supragingival plaque related parameters, the subjects exhibited low levels of plaque index and modified plaque index, as well as gingival index and modified bleeding index scores. The values confirm that the subjects had good standards of oral hygiene, with negligible features of inflammation around the teeth and DI. No significant statistical difference was observed when plaque index and modified plaque index scores were compared. Similar to this, Abreu et al.,[5] Bragger, et al.,[7] Ericsson et al.,[15] Anand and Mehta [16] did not notice statistically significant difference in plaque scores of dental implants and natural teeth.

Same as that of plaque indices, inflammation did not differ between natural teeth and DI in the present study. The correlation among supragingival plaque and gingivitis/mucositis was exhibited herein. It is significant to emphasize that the level of inflammation was very minimal which suggested an ideal pattern of plaque control. The minimal values of supragingival plaque-related parameters observed in our study were in line with the findings of Brägger et al.,[7]Karoussis et al.[17]

In the present study, higher subgingival plaque-related parameters such as probing depth, and bleeding on

probing were noted in DI when compared with natural teeth. Similar to this, Cutrim, et al., noted an increased probing depth in DI when compared with respective natural teeth.[18] The authors attributed this difference to the density of peri-implant tissues, which is thought to influence the probing depth. The peri-implant tissue is known to exhibit minimal resistance to clinical probing, and consequently, deeper penetration could be noted by the probe around implants.[18]

In our study, the DI exhibited double the percentage of bleeding as compared to natural teeth, in contrast to this Abreu et al.,[5]Cutrim, et al.,[18] and AlZarea[19]noted same amount of bleeding on probing with respect to DI and the natural teeth. Absence of connective tissue fiber insertion to the implant surface and less amount of blood vessels, cells and increased collagen fibers are proposed as reasons behind increased bleeding at the sites of DI as compared to natural teeth.[19] Regarding clinical attachment levels, other reports such as Abreu et al.,[5] Bragger et al.,[7] and Sailer, et al.,[20]have observed significantly increased attachment level at DI compared to the natural dentition.

Conclusion

We did not observe any significant difference with regards to accumulation of plaque and marginal inflammation among natural teeth and DI. Whereas subgingival inflammation was more in DI than in teeth. Follow up studies to assess the health of tissues around DI at different stages of the service life of the implants are advised to be carried out in the future.

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