Original Research

Bone markers in peri- implant crevicular fluid of immediate loaded and non - loaded dental implants- A clinical study

Vikas Sharma[1], Shruti Dutta[2]

[1]BDS, MDS (Prosthodontics and Crown & Bridge and Implantology), Medical Officer, (Dental), Department of Health and Family Welfare, Himachal Pradesh, India;
[2]BDS, MDS (Oral and Maxillofacial Surgery), Private Consultant, Himachal Pradesh, India

ABSTRACT:
Background: The present study was conducted to assess bone markers level in peri-implant crevicular fluid of immediately loaded and non-loaded dental implants. **Materials & Methods:** The present study was carried on 50 patients who were divided into 2 groups of 25 each. Group I received immediate loaded dental implants and group II received non-loaded dental implants. Modified bleeding on probing index was assessed in both groups at 1 month, 2 months, 3 months and 4 months interval. TGF-α and OCN levels were assessed. **Results:** The mean age in group I was 54.2± 4.6 years and 55.4± 5.1 in group II. Group I had 13 males and 12 females, while group II had 15 males and 10 females. The mean peri-implant sulcus depth at 1 month was 3.6± 0.5 and 3.4± 0.4 in group I and group II. At 2th month it was 2.6± 0.4 in group I and 2.5± 0.3 in group II. At 3rd month, it became 2.5± 0.2 and 2.8± 0.1 in group I and group II respectively. While in 4th month, it decreased to 2.1± 0.1 in group I and 2.5± 0.1 in group II. The difference was significant (P< 0.05). TGF- α level at 7th day in group I (10 pg/mL) and group II (6 pg/mL) was non-significant (P> 0.05). It was 76, 46, 34, 26 and 22 in group I and 10, 14, 65, 72 and 40 in group II at 15, 30, 60, 90 and 120 days respectively. The level of OCN was 10, 35, 42, 92, 105 and 80 in group I and 6, 9, 15, 136, 124 and 120 in group II at 7, 15, 30, 60, 90 and 120 days respectively. The difference was significant (P< 0.05). **Conclusion:** Authors found that bone markers such as TNF- α and OCN were elevated in group I as compared to group II.
Key words: Bone markers, dental implants, TNF

Introduction

Dental implants are considered one of the best options for replacing missing teeth. The aim of any replacement therapy is to attain esthetics and function with maximum success rate. Once dental implants are inserted in bone, they unite by osseointegration. Better the osseointegration, higher will be the survival rate.[1]

Aesthetic and functional rehabilitation using dental implants is an alternative for the treatment of edentulous areas with high success rates.[2] Based on knowledge about the events of osseointegration and in an endeavor to reduce the waiting period before rehabilitation the immediate loading protocol was developed, reducing healing time and allowing prosthetic placement after implant insertion. Numerous studies have conducted so far depicting higher success and survival rate of immediate loaded dental implants.[3] This technique leads to molecular changes in patient, hence the concept behind immediate loaded dental implants should be known to us. It is evident that immediate loaded dental implants in edentulous area can lead to osseointegration early. Ogawa et al[4] suggested that osseointegration is the result of minerals deposition around dental implants. The present study

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was conducted to assess bone markers level in peri-implant crevicular fluid of immediately loaded and non-loaded dental implants.

Materials & Methods

The present study was conducted in the department of Prosthodontics. It comprised of 50 patients of both genders. All were informed regarding the study and written consent was obtained. Ethical clearance was also obtained from institutional ethical committee.

General information such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I was immediate loaded implants group who underwent insertion of dental implants and prosthesis within 4 days. Group II patients underwent insertion of dental

implants in first stage and prosthetic parts after 4 months in later stage.

Dental implants were inserted following standardized aseptic surgical procedures. Patients were recalled after 1 month, 2 months, 3 months and 4 months interval for clinical evaluation. In all patients peri-implant sulcus depth (PISD), modified bleeding on probing index (MBOP) was measured and score was recorded. All the measurements were performed at 4 points at mesio-buccal, disto-buccal, mesio-lingual and disto-lingual sites. Peri-implant crevicular fluid was obtained for the assessment of bone markers such as TGFα, OCN, OPN and PTH. Results thus obtained were subjected to statistical analysis using chi-square test. P value less than 0.05 was considered significant.

Results

Table I: Demographic data of patients

Parameters	Group I	Group II	P value
Mean age	54.2± 4.6	55.4± 5.1	0.97
M:F ratio	13:12	15:10	1

**Table II: Peri-implant sulcus depth and modified bleeding on probing index in both groups**

Duration	Group I (mean)	Group II (mean)	P value
1 month	3.6± 0.5	3.4± 0.4	0.92
2 months	2.6± 0.4	2.5± 0.3	1.0
3 months	2.5± 0.2	2.8± 0.1	0.16
4 months	2.1± 0.1	2.5± 0.1	0.82

The difference was significant (P< 0.05)

Table III: Assessment of TG F- α level in both groups

Bone marker	Group I (mean)	Group II (mean)	P value
0	0	0	-
7	10	6	0.12
15	76	10	0.01
30	46	14	0.02
60	34	65	0.05
90	26	72	0.04
120	22	40	0.05

Graph I: Level of osteocalcin (OCN) in both groups
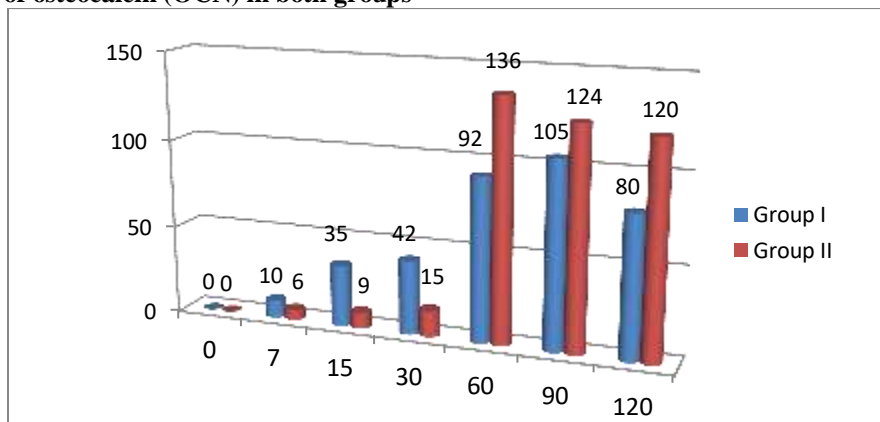
Graph I shows that the level of OCN was 10, 35, 42, 92, 105 and 80 in group I and 6, 9, 15, 136, 124 and 120 in group II at 7, 15, 30, 60, 90 and 120 days respectively. The difference was significant (P< 0.05).

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Discussion

To achieve predictable osseointegration for dental implants, Branemark advocated an unloaded healing time of 3–6 months. A healing period without early loading is currently still considered a prerequisite for implant integration.[5] Till date, this happens to be the most acceptable and most commonly followed treatment protocol. This shares some added advantages when compared to the early loading including extraction site preservation and allows time for soft tissue healing. The aim is to bring the implant prosthesis gradually into occlusion, after fixed intervals depending on the bone quality.[6] Bone markers show variation in their levels following dental implant insertion. They play significant role in the process of osseointegration. Several studies have been done showing impact of immediate loaded implants on osseointegration in animals.[7,8] The present study was conducted to assess bone markers level in peri-implant crevicular fluid of immediately loaded and non- loaded dental implants.

We found that mean age in group I was 54.2 ± 4.6 years and 55.4 ± 5.1 in group II. Group I had 13 males and 12 females and group II had 15 males and 10 females. The mean peri- implant sulcus depth at 1 month was 3.6 ± 0.5 and 3.4 ± 0.4 in group I and group II respectively. At 2 months, it was 2.6 ± 0.4 in group I and 2.5 ± 0.3 in group II. At 3 months, it became 2.5 ± 0.2 and 2.8 ± 0.1 in group I and group II respectively. At 4 months, it decreased to 2.1 ± 0.1 in group I and 2.5 ± 0.1 in group II. den Hartog L et al[9] in their study compared immediate loaded dental implants placed in maxillary anterior esthetic zone with conventional loading dental implants. Bleeding index and probing pocket depth was non- significant in both groups ($P> 0.05$) calculated after 6 and 18 months.

We found that TGF- α level after 7 days in group I (10 pg/mL) and group II (6 pg/mL) was non- significant ($P> 0.05$). It was 76, 46, 34, 26 and 22 in group I and 10, 14, 65, 72 and 40 in group II at 15, 30, 60, 90 and 120 days respectively. The level of OCN was 10, 35, 42, 92, 105 and 80 in group I and 6, 9, 15, 136, 124 and 120 in group II at 7, 15, 30, 60, 90 and 120 days respectively. The difference was significant ($P< 0.05$).

It is mentioned in the data that TGF family is linked to osteoblastic proliferation, differentiation, activity and collagen synthesis. Interestingly, this action during the initial phase of osteogenesis could be noted in our results. After the peak, TGFα levels were significantly decreased. This result suggests that loading stimulates the first stage of ossification and consequently, the next steps occur faster.[10]

Conclusion

Authors found that bone markers such as TNF-α and OCN was elevated in group I (immediate loaded implants) as compared to group II (non-loaded dental implants).

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