



## An in Vivo Evaluation of Bone Loss in First Six Months of Implant Loading with and without Platform Switched Abutments: A Clinical (Original Research) Study

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### KEYWORDS

Success, Bone Loss, Implants, Osteotomy, Surgery, Abutment, Platform Switching Concept

### ABSTRACT:

**Background & Aim:** bone loss around newly installed dental implant is highly unavoidable. This bone loss usually exhibit time dependent variable patterns. This in vivo study aimed to evaluate the bone loss in first six months of implant loading with and without platform switched abutments.

**Materials and Methods:** This clinical study was conducted on total 20 patients for bone loss in first six months of implant loading with and without platform switched abutments. Both male and female patients were included in detail. In 10 patients, implant loading was done over platform switched abutments (Group 1). In next 10 patients, implant loading was done over without platform switched abutments (Group 2). Clinical bone loss was noted in terms of Satisfactory, Non-satisfactory and Questionable statuses. It was noted at first 6 month. Results thus obtained was compiled and sent for necessary statistical analysis. P value less than 0.05 was considered as significant ( $p < 0.05$ ).

**Statistical Analysis and Results:** All data was processed by using statistical software Statistical Package for the Social Sciences. Maximum 8 patients were noticed in the age range of 25-29 years. P value was highly significant here (0.01). Minimum 2 patients were found in the age range of 40-44 years. In Group 1,  $n=10$ , total 8 cases showed satisfactory level of bone loss when evaluated clinically. P value was highly significant here (0.01). In Group 2, total 7 cases showed satisfactory level of bone loss when evaluated clinically. P value was not significant here (0.19). One-way ANOVA assessments done Between 2 groups revealed highly significant difference and p value (0.002).

**Conclusion:** Within the limitations of the study authors concluded that implants loaded over platform switched abutments showed less bone loss as compared to other tested group. Presumptions of our study must be considered as indicative for estimating the prognosis for similar clinical situations.



## Introduction

The final fate of any dental problem is usually characterized by loss of partial or complete dentition. Literature has well evidenced numerous methods and systems to replace missing teeth by removable or fixed ideology.<sup>1,2,3</sup> Internationally, there is a shifting trend towards fixed therapy for tooth rehabilitation. Since the preservation of tooth is also a significant factor, a clear inclination towards implant therapy has been noticed in developing as well as developed countries.<sup>4,5</sup> Furthermore, traditional fixed crown and bridges endanger the existing tooth exposure with augmented risk of pulpal revelation particularly in younger patients.<sup>6-9</sup> Implant dentistry have been extremely popular these days since it does not involve unnecessary tooth preparation. It is also considered safe in terms of pulpal involvements of abutment teeth.<sup>10</sup> However, implant therapy has its own limitations and surgery related risks. Many studies have evaluated short term and long term success of implant. Most of the studies are focused around the evaluations of bone loss around the implant in post operative phases. Albrektsson and associates were in the initial researchers who presented implant success criteria. They stated that crestal bone loss up to one mm in the first year is clinically accepted. Additionally, they mentioned that these bone losses are because of the normal bony physiology and remodeling processes hence cannot be avoided. Therefore, implant designs, techniques and other prosthetic measures must be directed to limit bone losses within this range. In this paper (in-vivo study), authors aimed to evaluate the bone loss in first six months of implant loading with and without platform switched abutments.

## Materials and Methods

This clinical study was planned, prepared and conducted on total 20 patients. All 20 patients were studied for bone loss in first six months of implant loading with and without platform switched abutments. Authors have performed the study in the patients who have undergone for implant placement at the department of Prosthodontics and Crown & Bridge of the institute. Both male and female patients were included in detail. Only single implant placement cases were chosen in the study. Only mandibular posterior region was the preferred area for implant placement and for further bone loss analysis. This confirmed data

quality and consistency in between samples predominantly about the number of implant regions estimated. Only one implant per patient was selected for maintaining data reliability. Systematic sampling was used for the selection of bias free individuals. Different exclusion criteria included: cardiac disease, renal issue, pregnancy, anemia, clairvoyant problems, patients with poor oral hygiene habits, patients with known history of smoking, gutka and other form of tobacco intake, uncooperative patients. Primary inclusion criteria were single missing edentulous area with well formed/healed alveolar bone. Other inclusion criteria were acceptable oral hygiene status, no tobacco related issues. Before starting of osteotomy procedure for implant placement, comprehensive history was recorded including demographic details and other associated findings. Written and signed informed consent was obtained from all patients. Local anesthesia administration was done in all cases to control intra-operative pain. In 10 patients, implant loading was done over platform switched abutments (Group 1). In next 10 patients, implant loading was done over without platform switched abutments (Group 2). Clinical bone loss was noted in terms of Satisfactory, Non-satisfactory and Questionable statuses. It was noted at first 6 month. Authors have determined to perform this study because such clinical studies are believed to be extremely important to obtain complete data about personal insights. Clinical studies are also competent of estimating the responses of patients at personal levels. Results thus obtained was compiled and sent for necessary statistical analysis. P value less than 0.05 was considered as significant ( $p < 0.05$ ).

## Statistical Analysis and Results

All the remarkable notations were compiled and sent for statistical evaluation using statistical software Statistical Package for the Social Sciences version 22 (IBM Inc., Armonk, New York, USA). The obtained data was subjected to suitable statistical tests to calculate p values and other statistical inferences. Responses and outcomes were analyzed. The participants were divided into four age groups. Table 1 and graph 1 demonstrated about the Age & Gender based statistical description of contributing patients. Maximum 8 patients were noticed in the age range of 25-29 years. P value was highly significant here (0.01). Minimum 2 patients were found in the age range of 40-44 years. Total 11 male and 9



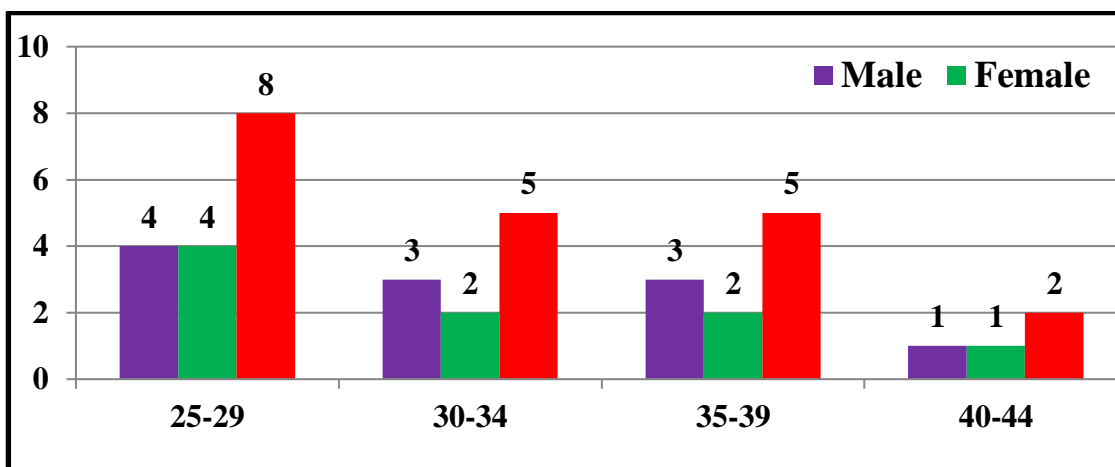
female patients were studied specifically. Basic statistical description with level of significance assessment using “Pearson Chi-Square” test and interpreted as satisfactory or non-satisfactory or Questionable statuses (for clinical bone loss in platform switched abutments) after 6 month of loading procedures (Group 1, n=10). Total 8 cases showed satisfactory level of bone loss when evaluated clinically. P value was highly significant here (0.01). However, 1 patient each exhibited Non-satisfactory and Questionable responses. Basic statistical description with level of significance assessment using “Pearson Chi-Square” test and interpreted as satisfactory or non-

satisfactory or Questionable statuses (for clinical bone loss in without platform switched abutments) after 6 month of loading procedures (Group 2, n=10). Total 7 cases showed satisfactory level of bone loss when evaluated clinically. P value was not significant here (0.19). However, 2 patients exhibited Non-satisfactory responses. P value was highly significant here (0.02). 1 patient exhibited Questionable responses. Table 4 is about the evaluation amongst all 2 studied timings using one-way ANOVA. Assessments done Between 2 groups revealed highly significant difference and p value (0.002).

**Table 1: Age & Gender based statistical description of contributing patients**

Age Group (Yrs)	Male	Female	Total	P value
25-29	4	4	8	0.01*
30-34	3	2	5	0.20
35-39	3	2	5	0.50
40-44	1	1	2	0.80
Total	11	9	20	*p<0.05 Significant

**Graph 1: Patients demographic assortment and related details**



**Table 2: Basic statistical description with level of significance assessment using “Pearson Chi-Square” test and interpreted as satisfactory or non-satisfactory or Questionable statuses (for clinical bone loss in platform switched abutments) after 6 month of loading procedures (Group 1, n=10)**

Status	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Square	Chi- df	p value
<b>After 6 Months</b>								
Satisfactory	8	1.21	0.940	0.376	1.96	1.549	1.0	0.01*
Non-satisfactory	1	1.01	0.230	0.940	1.12	1.904	2.0	0.08
Questionable	1	1.01	0.230	0.940	1.12	1.904	2.0	0.08
<b>*p&lt;0.05 significant</b>								



**Table 3: Basic statistical description with level of significance assessment using “Pearson Chi-Square” test and interpreted as satisfactory or non-satisfactory or Questionable statuses (for clinical bone loss in without platform switched abutments) after 6 month of loading procedures (Group 2, n=10)**

Status	n	Stat. Mean	Std. Dev.	Std. Error	95% CI	Pearson Square	Chi- df	p value
<b>After 6 Months</b>								
Satisfactory	7	1.16	0.049	0.940	1.26	1.560	1.0	0.19
Non-satisfactory	2	1.10	0.230	0.524	1.12	1.921	2.0	0.02*
Questionable	1	1.01	0.230	0.940	1.12	1.904	2.0	0.08
<b>*p&lt;0.05 significant</b>								

**Table 4: Evaluation amongst all 2 studied groups using one-way ANOVA**

Variables	Degree of Freedom	Sum of Squares $\Sigma$	Mean Sum of Squares $m\Sigma$	F	Level of Sig. (p)
Between 2 groups	3	2.054	1.238	1.1	0.002*
Within 2 groups	18	2.039	0.125	-	
Cumulative	121.42	12.577	<b>*p&lt;0.05 significant</b>		

## Discussion

One of the most explored clinical dilemmas of implant therapy is crestal bone loss and their effects of implant survival. Moreover, crestal bone loss around implant cannot be completely controlled since it is related to normal physiology and cellular changes of alveolus. Few of the noteworthy factors of peri implant bone loss include type of graft used, amount of bacterial activity, status of underlying systemic disease, attitude towards teeth cleaning, history of tobacco habit, site of implant osteotomy and operator surgical expertise. Abrahamsson and other colleagues have studied in detail about the peri-implant hard and soft tissues at different implant systems. They stated that early bone loss around the implant is multifactorial and cannot be comprehensively controlled by operator.<sup>10</sup> These inferences were in accordance with our conclusions. Sesma and other coworkers assessed Marginal Bone Loss around Platform-Matched and Platform-Switched Implants. Their results were highly critical. They also concluded that bone loss is seen at a faster rate in the first 6 months of implant placement.<sup>11</sup> Chrcanovic and other researchers have performed a meta analysis on the Platform switch and dental implants. Their outcomes were highly predictive and significant.<sup>12</sup> Atieh and other have also studied an similar study about the Platform Switching for Marginal Bone Preservation around

Dental Implants. Their results were highly imperative and vital. It was highly comparable with our results and outcomes.<sup>13</sup> Fernández-Formos conducted a randomized controlled trial on the Radiographic evaluation of marginal bone maintenance around tissue level implant and bone level implant.<sup>14</sup> Di Girolamo M and other researchers have studied about the Bone level changes around platform switching and platform matching implants.<sup>15</sup> Their results were highly imperative and critical.<sup>15</sup> Researchers have shown several significant factors those are directly or indirectly responsible for bone loss around implant. Other researchers have also conducted other similar studies with critical and significant outcomes.<sup>16-21</sup>

## Conclusion

Our study results unquestionably showed the clinical status of early bone loss in studied patients. Within the limitations of the study authors concluded incredibly critical outcomes. They concluded that platform switched abutment is a viable option in reducing the clinical bone loss around dental implants. However, its overall success and longevity depends on several interrelated factors and host responses. In this study authors showed that implants loaded over platform switched abutments showed less bone loss as compared to other tested group. Inferences of our study should be considered as suggestive for assuming prognosis for



similar clinical circumstances. However, authors expect few large scale studies to be conducted in these regards.

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