Assessment of factors affecting success of dental implants- A clinical study

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INTRODUCTION

The use of dental implants is now a widely accepted treatment modality for fully and partially edentulous patients. The success of this approach is rooted in the inherent ability of some dental materials, titanium in particular, to osseointegrate, thereby creating direct bone-to-implant contact. Further improvements toward the successful osseointegration of dental implants have involved modifications to both surfacetopography and surface chemistry.¹

The commonly accepted criteria for the assessment of implant success were proposed by Albrektsson and colleagues to identify clinical evidence of successful osseointegration and survival of implants. Over the past three decades, implant success has been assessed by survival

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rates, continuous prosthesis stability, radiographic bone loss, and absence of infection in the peri-implant soft tissues.\(^2\) Long-term results of implants placed with guided bone regeneration, and outcomes for the treatment of atrophic posterior maxillae have also been reported.\(^3\) Moreover, the use of dental implants can often avoid the integration of unrestored adjacent teeth or the use of a removable prosthesis. Implant systems characterized by micro-rough surfaces and internal abutment connections result in successful healing and long-term clinical performance.\(^4\) Nonetheless, it should be remembered that early failure (no or inadequate osseointegration, i.e., intimate bone-to-implant connection before functional loading) can also occur. Early failures account for approximately 2–6\%\(^5\) of implants placed, and the incidence can be even higher for implants placed in specific risk populations.\(^6\) The present study was conducted to assess success rate of dental implants in population.

**Materials & Methods**

This retrospective study was conducted in the department of Prosthodontics. It comprised of 56 patients with 110 dental implants. The study protocol was approved from institutional ethical committee. All patients were informed regarding the study and written consent was obtained.

Data related to patientssuch as length of implant, diameter of implant, location of implant, bone quality were retrieved from the patient’s record file. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant using chi-square test.

**Results**

**Table I Distribution of patients**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Patient</th>
<th>Implant</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-40 years</td>
<td>25</td>
<td>50</td>
<td>0.05</td>
</tr>
<tr>
<td>40-60 years</td>
<td>16</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>&gt;60 years</td>
<td>15</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>110</td>
<td></td>
</tr>
</tbody>
</table>

Table I shows that age group 20-40 years had 25 patients with 50 implant, age group 40-60 years had 16 patients with 40 implant and >60 years had 15 patients with 20 dental implants. The difference was significant (P< 0.05).
Table II Dental implant and failure rate

<table>
<thead>
<tr>
<th>Implant length</th>
<th>Total</th>
<th>Failure</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10 mm</td>
<td>50</td>
<td>10</td>
<td>0.05</td>
</tr>
<tr>
<td>10-11.5 mm</td>
<td>25</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>&gt;11.5 mm</td>
<td>35</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Table II, graph I shows that 10 implants with length < 10 mm showed failure, 4 implants out of 25 implant with length 10-11.5 mm showed failure and 6 implants out of 35 implants with size >11.5mm showed failure. The difference was significant (P < 0.05).

Graph I Dental implant and failure rate

Graph II Bone quality and failure rate

Graph II shows that out of 45 implants placed in bone with type I quality, 6 showed failure. Out of 30 implants placed in bone with type II quality, 4 showed failure. Out of 20 implants placed in bone with type III quality, 3 showed failure. Out of 15 implants placed in bone with type IV quality, 3 showed failure. The difference was significant (P< 0.05).

Discussion
Since then, new parameters have been introduced to assess success in the achieving of lifelike implant restorations. These include health status and natural-looking peri-implant soft tissues, as well as prosthodontic parameters, esthetics, and patient satisfaction. However, osseointegration remains the predominant parameter in implant dentistry. It seems logical that the current definition of success criteria should be comprehensive, to include these additional factors. There is still a lack of homogeneity in the dental literature on reporting complications at
both implant and prosthetic levels. A previous systematic review has shown that as much as 38.7% of all implant-supported fixed partial dentures (FPD) for partially edentulous patients had some type of complication during the observation period of 5 yrs. This finding highlights the importance of including prosthesis success in analyses of the overall success of dental implants. The present study was conducted to assess success rate of dental implants in population.

In present study, age group 20-40 years had 25 patients with 50 implant, age group 40-60 years had 16 patients with 40 implant and >60 years had 15 patients with 20 dental implants. Buser et al found that eleven studies of low to moderate methodological quality were studied. Implants placed in sites with history of one and two implant failures had a weighted survival rate (SR) of 88.7% and 67.1%, respectively. Implants placed in sites with a previous early failure revealed a weighted SR of 91.8%. First implants presented higher SR than implants placed in sites with one or two previous implant failures. In contrast, implants placed in sites with one and two implant failures had similar SR.

We 10 implants with length < 10 mm showed failure, 4 implants out of 25 implant with length 10-11.5 mm showed failure and 6 implants out of 35 implants with size >11.5 mm showed failure. Albrektsson et al found that out of 186 implants (4.8%) placed in 106 participants failed before incorporation of the final prosthesis. The use of shorter implants (<10 mm) and the need for augmentation procedures were associated with a greater risk of early implant failure. For shorter implants, the risk was 5.8 times greater than that for longer implants (p = 0.0230). Use of augmentation procedures increased the risk by a factor of 5.5 (p = 0.0174). Implants placed in the dental practice with a specialization in implantology heal successfully. The use of augmentation procedures and of implants shorter than 10 mm seems to be associated with a greater risk of early implant failure.

Gallucci et al proposed success criteria for implant FCDPs based on implant, peri-implant tissues, prosthodontic, and subjective parameters. They reported a 95.5% survival rate vs. an 86.7% success rate when their proposed success criteria were applied. FCDPs were deemed as successful when a total of four or fewer complications (mild or moderate severity) were encountered, and these could be addressed chair-side in a single visit. Additionally, patient satisfaction with overall treatment was rated good or excellent for the treatment outcome to
be considered successful.

**Conclusion**

Authors concluded that maximum dental implant failure was reported in dental implant with length less than 10 mm and in type IV bone.

**References**