

## Peri-Implantitis – A Growing Complication of Dental Implant Prosthesis

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### ABSTRACT

Contemporarily, dental implant is considered as the gold standard for managing complete or partially edentulous patients. Even though with meagre rates of failure, peri-implantitis is one complication that is worth deciphering. The prevalence of peri-implantitis is reportedly increasing with time so correct diagnosis is the most important factor for proper management of peri-implant disease. Regular evaluation and elimination of risk factors (history of periodontitis, poor oral hygiene, diabetes, smoking, alcohol consumption, genetic traits, absence of keratinized mucosa and implant surface) are effective precautions against peri implantitis. The management of peri-implant mucositis is also considered as an important preventive measure for the onset of peri- implantitis. In addition to aspects of osseointegration, type and structure of the implant surface are of importance. For the treatment of peri-implant disease multiple conservative and surgical methods are available. To minimize its detrimental effects, it is important to take a holistic view of the condition. Therefore, this review gives an overview on the prevalence, etiology, risk factors, prevention and treatment of peri-implantitis.

**Keywords:** Complication, Dental Implant, Inflammation

### INTRODUCTION:

Dental implants have become a well-accepted therapy for the replacement of missing teeth in dentistry. Dental implants have relatively better survival rate (>10 years) as compared to other dental prosthesis.<sup>1</sup> Success rates of around 88% were reported after 15 years follow-up.<sup>2</sup> In the last decade, increasing number of evidence have been reported on the presence of peri-implant inflammations which is one of the most common complications that effects the soft and hard tissues surrounding an implant which can eventually cause the implant loss. Therefore, strategies for treatment and prevention of peri-implant disease should be included in the modern concept of rehabilitation in dentistry.

In a successful implant, there's a tight seal between peri-implant mucosa and trans-mucosal component of implant.<sup>3</sup> It is generally considered that during initial healing phase after implant installation, there is a loss of crestal bone of around 0.5 and 2 mm.<sup>4</sup> Any additional bone loss after initial healing phase suggests peri-implant disease.<sup>5</sup> According to a study conducted by Renvert et al; any bone loss greater than 2mm is indicative of peri-implantitis.<sup>5</sup> Clinically, peri-implantitis can be determined by peri-implant mucosal inflammation, which includes redness, bleeding on probing

and exudation, along with a loss of the supporting tissues which shows increases in probing depths and progressive radiographic bone loss.<sup>6</sup> Multiple factors are involved in the evaluation of peri-implant health and disease which include bleeding on probing (BOP) and changes in crestal bone level with or without deepening of peri-implant pockets (PPD).<sup>7</sup>

### METHODOLOGY:

To obtain available data of interest GOOGLE and GOOGLE SCHOLAR were used as electronic databases. The literature search was performed on articles published from 2014 to 2018. Key words such as *Peri-implantitis*, *periimplant mucositis*, *definition of periimplantitis*, *risk factors*, and *treatment of perimplantitis* were used. Among 200 articles, 44 were short listed on the basis of suggested title. A major content of this article was based on risk factors and treatment options available for periimplantitis. Figure-1.

### LITERATURE REVIEW:

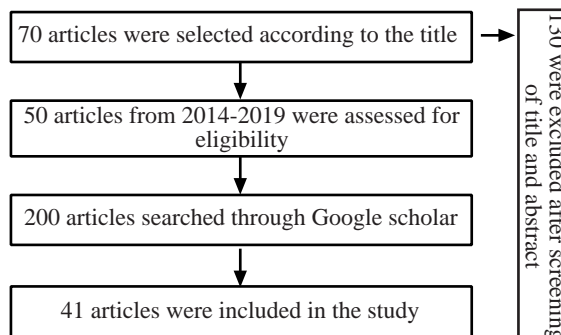
**DEFINITION AND DIAGNOSIS:** In comparison with gingivitis and periodontitis which is affecting natural teeth, disease affecting soft and hard tissue surrounding implant is called peri-implant mucositis and peri-implantitis. Peri-implant mucositis is an inflammation of the soft tissues or

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mucosa surrounding a dental implant, without additional bone loss after the initial bone remodeling that may occur during healing following the surgical placement of the implant.<sup>8</sup> Whereas 'Peri- implantitis is an inflammatory lesion of the mucosa surrounding an endosseous implant and with progressive loss of supporting peri-implant bone'.<sup>3</sup> It is thought that peri-implant mucositis usually leads to peri-implantitis if not treated on time.

#### **ETIOLOGY AND PREVALENCE:**

There are several reports on the prevalence of peri-implantitis which range from 1 to 47%. In a systematic review, the weighted mean prevalence of peri-implantitis was 22%.<sup>9</sup> Prevalence of peri-implantitis was evaluated, and revealed that 10% of all inserted implants and 20% of all implanted patients showed peri-implantitis.<sup>13</sup> Peri-implantitis results from an imbalance between the host response and oral biofilm at the implant surfaces. Formation of a bacterial biofilm around the implant is considered as a main etiological factor in the development of peri-implantitis.<sup>10</sup> Gram negative anaerobic bacteria found in bacterial biofilm includes Fusobacteria, Spirochetes, and black-pigmenting organisms such as *Prevotella Intermedia*.<sup>11</sup>

#### **RISK FACTORS:**

Correct diagnosis is the most important factor for proper management of peri-implant disease.<sup>14</sup> The risk factors which result in peri-implantitis include history of periodontitis, poor oral hygiene, diabetes, smoking, alcohol consumption, genetic traits, absence of keratinized mucosa and implant surface.<sup>15</sup>

**Oral hygiene:** Microbial colonization of the implant surface takes place as soon as it is exposed to the oral cavity.<sup>16</sup> Inaccessibility can interfere with oral hygiene maintenance which can cause peri-implantitis.<sup>17</sup> In a study, peri-implantitis was developed in 48% of the implants due to lack of proper oral hygiene maintenance because of inaccessibility.<sup>18</sup>

**History of periodontitis:** Periodontitis is one of the most common oral disease which is ranked as 6<sup>th</sup> most prevalent disorder in its severe form.<sup>19</sup> The worldwide prevalence of periodontal disease in the general adult population is 30-35%.<sup>5</sup> According to WHO estimates, the prevalence of chronic periodontitis estimates in the Pakistani population is 30%.<sup>20</sup> Whereas in a cross sectional study, the incidence of peri-implantitis was found to be 15.1% in the non-periodontitis and 26% in subjects with a history of periodontitis.<sup>21</sup> Rocuzzo et al. followed 149 patients and categorized them as periodontically healthy, moderately and severely compromised. He reported that the frequency of bone loss =3 mm (0%, 9.4%, 10.8%) and PD=6mm (4%, 16%, 24%, respectively) was increasing significantly with each group. The result also concluded that the peri-implantitis treatment was more extensive in patients with the history of periodontitis.<sup>22</sup> Donati et al. reported in a 20 year follow up study that the risk of peri-implantitis was more in the

patients with the history of periodontitis.<sup>23</sup> So there is strong evidence that the history of periodontitis is a major risk factor in the development of peri-implantitis with different outcome of implant therapy in patients with or without periodontal disease.

**Diabetes mellitus** is a chronic metabolic disease which presented as hyperglycemia with other side effects. Diabetes as a relative contraindication for implant has always been controversial due to impaired healing found in diabetic patients.<sup>24</sup> Aguilar-Salvatierra reported that the peri-implantitis increased with patients having elevated level of HbA1c.<sup>25</sup> The cross-sectional study of 5 years conducted by Daubert Dm et al. showed an elevated risk for peri-implantitis of 1.9 in diabetics.<sup>26</sup> On contrary, the prospective study of Oates et al. reported no evidence of clinical signs of peri-implantitis 1 year after implantation.<sup>27</sup>

**Smoking:** Smoking causes impairment of various adaptive and innate host responses.<sup>28</sup> Several studies have affiliated smoking with dry socket, tooth loss, periodontitis and impaired wound healing post-surgery.<sup>29</sup> Another study evaluated that the smoking has a negative effect on implant survival.<sup>30</sup> The patients who smoke before the placement of implant were 35% more prone to implant failure and those who smoke after placement have 75% risk of failure as compared to non-smokers.<sup>(31,32)</sup> The relationship between peri-implantitis with smoking is still controversial, as some studies have failed to identify any significant differences of peri-implantitis among smokers and non-smokers.<sup>(33,34,35)</sup> Thus, the information available on the smoking as a risk factor to peri-implantitis is still insufficient.

**Implant surface:** In vivo studies showed no correlation between design and surface texture of the trans-mucosal portion of implants to peri-implantitis. The development of peri-implantitis is not effected by dimensions of keratinized tissues present between mucogingival junction and the peri-implant mucosal margin. Some evidence studies suggest that excess cement is also a risk factor for peri-implant inflammation.<sup>12</sup>

#### **TREATMENT:**

Surgical treatment is usually required to treat peri-implantitis whereas only nonsurgical therapy can be used to treat to peri-implant mucositis. It was particularly emphasized proper oral hygiene maintenance, diagnosis and professional plaque removal is required to prevent any implant related disease.<sup>12</sup> Adjunctive therapy (use of antiseptic mouthwashes/antibiotics) showed no improvement in the efficacy of professionally administered plaque removal (PAPR) in peri implant disease patients.<sup>36</sup>

**Non-Surgical Treatment:** Peri-implantitis is not completely eliminated by mechanical debridement alone. Therefore, adjunctive therapies rather than mechanical debridement alone have been recommended, such as laser, antibiotics, and photodynamic therapy.<sup>37</sup> A randomized clinical trial

about peri-implant therapy showed that non-surgical mechanical therapy alone and with adjunctive use of Perisolv(chloramine based oral gel), are equally effective in treatment of peri-implantitis up to 3 months.<sup>38</sup> Another study showed Adjunctive therapy (use of antiseptic mouthwashes/antibiotics) showed no improvement in the efficacy of professionally administered plaque removal (PAPR) in peri implant disease patients.<sup>36</sup> Another study of peri-implant mucositis do not recommended adjunctive antiseptics/antibiotics (local and systemic) over alone. A study by Schwarz et al. recommended alternative measures for plaque removal (i.e. Glycine powder air polishing, erbium- doped, yttrium aluminium garnet laser—ERL) and adjunctive local antibiotics over the MD alone.<sup>39</sup> J Gordon et al, assessed the long-term clinical outcomes following non-surgical therapy of peri-implant diseases and concluded that both mechanical debridement with Chlorhexidine and ERL were successful on the long-term, but failed to attain a complete disease resolution.<sup>40</sup>

Surgical treatment: De Waal et al. suggest that “experience of the surgical team,” “amount of bone loss” and “smoking” are the factors which indicate the prognosis of surgical treatment of peri-implantitis.<sup>41</sup> It is reported that at least 12 months follow up is required to evaluate the effects of surgical treatment but 6 months follow up can also be useful as patient enters maintenance phase by 6 months.<sup>42</sup>

Resective peri-implantitis surgery: Koldslund et al. conducted a study on short-term effects of surgical treatment of peri-implantitis, and its prognostic indicators. He indicated that the inflammation is reduced by resective peri-implantitis surgery but bleeding on probing/suppuration was still present which requires evaluation and long-term maintenance. The presence of suppuration and bone loss of more than 7mm prior to surgical treatment reduces the effects of treatment.<sup>43</sup>

Smoking has a negative prognostic effect on the surgical treatment of peri-implantitis.<sup>41</sup> Characteristics of implant surface also have an impact on the prognosis of surgical treatment of peri-implantitis.<sup>44</sup> Machined/smooth surfaces recorded to have less inflammation than the modified implant surface. However this variable was not recognized as a prognostic indicator in multilevel studies.<sup>43</sup> The location of implant also plays a part in outcome of the treatment. Lingual and buccal sites have less pocket depth and bop as compared to approximal sites. There are several possible reasons for this. First, buccal/lingual sites shows more mucosal recession. Secondly, alveolar bone of neighboring teeth have a higher level which might create a bony inclination towards the implant. In addition, the location of the implant site is also effected by accessibility of oral hygiene.<sup>43</sup>

#### CONCLUSION:

Peri-implantitis is a severe complication that results in failure of dental implants. Thus, proper oral hygiene along with

concerned local and systemic factors should be kept in view to prevent the inflammation of the surrounding tissues of the implant. Various surgical and non-surgical treatment modalities are also available to counter peri-implantitis and should be applied as per their indications. Correct diagnosis of peri-implant disease is critical for appropriate management of peri-implant disease.

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