

**UNIVERSITI TEKNOLOGI MARA**

**FACTORS AFFECTING DENTAL  
IMPLANT SUCCESS IN PARTIALLY  
EDENTULOUS PATIENTS:  
AN OVERVIEW OF SYSTEMATIC  
REVIEWS**

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## ABSTRACT

**Introduction:** Different dental implant surgical techniques, protocols and properties could variably impact dental implant treatment outcomes. To date, no gold standard in dental implant treatment exists despite many systematic reviews. Therefore, this overview summarises evidence from systematic reviews (SRs) of randomised controlled trials (RCTs), to determine the effect of different dental implant surgical techniques, protocols, and properties on the success of dental implant treatment in partially edentulous patients. **Methodology:** PubMed, SCOPUS, Web of Science, EBSCOhost, Cochrane Library and CRD databases were searched without time or language restrictions. Eligible SRs reporting on comparators of dental implant surgical techniques, protocols and properties and outcomes of marginal bone loss (MBL) as well as the success, survival, and failure rates were included. Meta-analyses were conducted on RCTs reporting the same outcomes when not done in the SRs. Heterogeneity was explored through subgroup analyses and the methodological quality was appraised by the AMSTAR 2 tool. **Results:** Sixty-two eligible SRs were included. Meta-analyses revealed statistically greater MBL in immediate implant placement compared to delayed placement [ $p=0.001$ , MD: -0.06; 95% CI: -0.10, -0.03]. MBL is statistically greater in longer implants compared to short implants [ $p<0.01$ , MD= -0.11mm; 95% CI= -0.16, -0.07], while in platform-switched implants the MBL in 0.85mm [ $p<0.01$ , MD= 0.89mm; 95% CI= 0.69, 1.10] and 0.20-0.25mm implant-abutment mismatch [ $p<0.01$ , MD= 0.51mm; 95% CI= 0.41, 0.61] is statistically significantly lower than platform-matched implants. The methodological quality of the SRs was found 'low' in four SRs and 'critically low' in fifty-eight. **Conclusion:** Different dental implant surgeries and properties may variably impact treatment success in partially edentulous patients. Short implants with rough collars and platform-switching with mismatch of 0.85mm and 0.20-0.25mm endure less MBL. Nonetheless, more high-quality RCTs are needed in this field of study.

**Keywords:** *Dental implant success, implant surgery, implant properties, marginal bone loss,*

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# **CHAPTER 1**

## **STUDY BACKGROUND**

### **1.1 Research Background**

#### **1.1.1 Introduction**

Partial edentulism is defined as a state of the oral cavity in which teeth have been lost from either one or both dental arches; the extent of tooth loss can range from a single tooth to all teeth except one (Jeyapalan & Krishnan, 2015). Tooth loss can occur due to several reasons, such as caries, periodontal disease, trauma, impactions, supernumerary teeth and oral pathologies such as cysts and tumours(Jeyapalan & Krishnan, 2015).

Today, the options for oral prosthetic rehabilitation for partial edentulism have become more comprehensive. These options range from a variety of conventional removable dentures to fixed prostheses supported by tooth abutments or dental implants. Conventionally, dental implants comprise two main components. Namely, a surgical endosseous fixture that functions as the 'root', and a crown-simulating prosthetic suprastructure above the gingival line. This suprastructure can take the form of a crown, a bridge, or a mountable overdenture. Nowadays, a dental implant may also comprise a single unit with no separate components.

Dental implants have significant merits over all the other restorative modalities. They are superior in both aesthetics and function, as they closely mimic the appearance and tactile sensation of natural teeth. Dental implants possess the quality of 'osseoperception' tied to mechanoreceptors, similar to a natural tooth's proprioception (Ferguson, 2018). This feature allows better pressure and texture identification and gauging of occlusal forces, a significant and crucial quality missing in other rehabilitative options(Klineberg I & Murry G, 1999). Dental implants are endosseous and engage the bone through osseointegration. As a result, implant is the only dental prosthesis that preserves the alveolar bone and potentially prevents significant resorption of the residual ridge(Zumstein et al., 2019). Unlike dental bridges where part