

Current Evidence on the Use of PEEK as Implant Abutment Material

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Rehabilitation of partially or completely edentulous arches with dental implants is a well-known treatment procedure in dentistry. Titanium implants have been used for a long time because of their good biocompatibility and high corrosion resistance. However, in cases where soft tissue thickness is less (<2 mm), titanium, due to its metallic nature, causes graying of the surrounding implant tissues. This results in compromised esthetics, which needs a metal-free abutment to overcome the same.¹ Recently, polyetheretherketone (PEEK), a synthetic tooth-colored polymeric thermoplastic material, has been of great interest to researchers for its use as implant abutment material.^{2,3}

Ortega-Martínez et al.,³ in an *in vitro* study, evaluated the functional and mechanical properties of PEEK as dental implant abutments so that it can be used as a nonmetallic alternative to titanium abutments. They found that the loss of torque with titanium abutments was approximately 10% when compared to PEEK, having a 50% loss. Under dynamic loading, all PEEK abutments showed microleakage, while only 8.4% of the titanium abutments showed microleakage. Matos et al.,⁴ in an *in vitro* study, evaluated the biomechanical behavior of different sizes of PEEK abutments on titanium implants. They concluded that PEEK abutments should be used with care, as they resist only moderate forces. There was a plastic strain and large vertical displacement seen with PEEK abutments at the abutment-implant junction. They suggested that the use of PEEK abutments should be restricted to temporary restorations in patients without parafunction and requiring rehabilitation in the anterior region.

Ragupathi et al.⁵ analyzed the wear resistance of PEEK and titanium implant abutments under cyclic loading. They found that titanium abutments have more wear resistance than PEEK abutments; however, the difference is statistically insignificant. PEEK can be considered for use as a definite abutment. Milinkovic et al.,⁶ in their immunohistochemical and histological study, had compared the soft tissues' reaction to titanium and PEEK healing abutments. They found that PEEK healing abutments seem to cause severe tissue inflammatory response. These were mainly produced by the activation of plasmacytes and histocytes. In the case of titanium healing abutments, the inflammatory reaction was of lower intensity and mainly triggered by B-cells.

Ghazal-Maghras et al.,⁷ in their systematic review, evaluated the functional and mechanical properties of PEEK as abutments and its efficacy as a substitute for titanium abutments. The data available has shown insufficient evidence in favor of PEEK being used as definitive abutments, which can replace titanium. There are very limited *in vivo* studies available comparing PEEK and titanium abutments. Most of the research done on PEEK as abutment material were *in vitro* studies, which had not favored PEEK as a definite abutment.

More long-term *in vivo* studies are needed using PEEK as a definite abutment so that it can be made clear whether it is an available alternative to titanium or not. Currently, the use of PEEK

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must be restricted to temporary abutments in the anterior region in patients without any parafunction habits.

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