



PROPERTIES OF PEEK- A NARRATIVE REVIEW

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ABSTRACT

Dental implants made of titanium has its own limitations and may cause a number of issues, such as hypersensitivity to the metal. A semi-crystalline linear polycyclic thermoplastic called polyetheretherketone (PEEK) has been suggested as a metal-free alternative for biomaterials. PEEK can also be used as a superstructure, implant abutment, or implant body when making dental implant components. This article provides a summary of the desirable properties of PEEK and it's applications in prosthetic dentistry.

KEYWORDS :**Properties Of Peek- A Narative Review**

Rehabilitation of edentulous patients is claimed to be successful if the patients visit for maintenance of prosthesis is limited. The post treatment care requires less clinical visits if the prosthesis serves longer duration with improved properties. PEEK, the newer material offers properties comparable to existing materials. The conventional materials used for prosthesis fabrication includes base metal alloys, titanium and its alloys. Few properties of PEEK are favorable to choose this material for Cast Partial framework, implant fixtures and abutments and metal substrate in FPD. The modulus of elasticity is one such property that favours use of peek as an alternative to other alloys in implant fabrication. PEEK (Polyether ether ketone) was introduced for industrial purpose and later found its application in orthopedic surgeries. This article briefly discusses the properties of alloys and its application in various prosthesis fabrication.

Properties Of Peek

PEEK does not produce artefacts on radiographic imaging as it has radiography translucency and is comparable to cortical bone regarding its elasticity [4]. PEEK is also nonmagnetic and nonallergic and doesn't develop exothermic reactions [4]. It has excellent strength, stiffness and fatigue property. During high temperatures in harsh environment it has good resistance to wide range of chemicals, and with low permeability PEEK material has low moisture absorption.

Surface modification of PEEK enhances the cell adhesion, proliferation, biocompatibility, and osteogenic properties of PEEK implant materials thus recent studies has focused on improving on it. PEEK influences the biofilm structure and reduces the chances of peri-implant inflammations. Since PEEK is chemically inert with a hydrophobic surface, it does not readily allow protein adsorption on its surface. For this

reason, PEEK polymers are known to be bioinert in hard and soft tissues when present as a bulk implant.

Uses Of Peek

PEEK is most commonly used in maxillo-facial surgery [4], and is a suitable material for provisional restorations, including fixed dental prostheses during dental implant treatment [3].

PEEK biomaterials are becoming popular as healing abutments and in PEEK with titanium base temporary abutments. Notably, PEEK is recommended as a long-term provisional crown material in cases where other auxiliary treatments are planned. Compare to other conventional material PEEK exhibit superior flexural strength (140 - 170 MPa) thus protecting restoration from bulk fracture hence it can be used as a crown [2].

Compared the load bearing capacity of inlay - retained FPDs fabricated from PEEK versus other reason based materials found that PEEK has highest load bearing capacity and could be considered as alternative to fiber reinforced composite material [2].

Limitations

The elastic modulus of PEEK is very low compared to those of cortical bone, Titanium, and ceramic materials. For dental implant Materials high elastic modulus is required. To overcome this, various reinforced PEEK composite material are developed, which includes carbon fiber-reinforced PEEK (CFR-PEEK) and glass fiber-reinforced PEEK (GFR-PEEK) etc [1].

PEEK has an inert surface that makes adhesion difficult, and this is an important hindrance to its potential for widespread application in prosthodontics. Numerous techniques have

been tested for improving the adhesion of PEEK, including acid etching, plasma treatment, air borne particle abrasion, laser treatment, and adhesive systems [2].

Comparing the fracture resistance of Titanium, PEEK, found that the Titanium screw had higher fracture resistance than PEEK [3]. In another study the insertion torque was compared between Titanium and PEEK implant that showed PEEK implant are not able to withstand the insertion force necessary to obtain primary stability for immediate loading [3].

CONCLUSION:

The properties of the PEEK was improved by modifying the existing raw material, to be more biocompatible and improve the fracture resistance to withstand the occlusal forces. The reinforcement with glass makes the material more esthetic compared to other base metal alloys. Peek has now become the material of choice for long term temporary restorations owing to its desirable properties.

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