EDITORIAL

Current Evidence on the Bond Strength of Surface-treated Peek with Resin

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International Journal of Prosthodontics & Restorative Dentistry (2022): 10.5005/jp-journals-10019-1367

Polyether ether ketone (PEEK) is a preceding member of the polymer family of polyaryletherketone. It is an organic synthetic polymeric material developed in 1978 and nowadays emerged as a promising alternative to metal, glass ceramics, and zirconia. Today PEEK is widely used in dentistry as interim implant abutments, fixed dental prostheses, partial removable dental prostheses, interim restorations, and endocrowns. There are certain limitations of the PEEK to be used as a crown with a monolithic design due to its opaque and white/grayish appearance. In such cases, layering of the PEEK with tooth-colored composite resin is required to meet the esthetic requirements of the patient.[1,2] Even researchers are going on to use PEEK as a postmaterial. However, bonding PEEK to composite resin and resin cement remains a challenge due to its low surface energy and resistance to surface modification.[3,4]

Attempts were made by many researchers[1,5–8] to increase the bond strength of PEEK with resin by the surface treatments of PEEK. Gouveia et al.[5] treated the PEEK specimens with airborne particle abrasion with 110 µm aluminum oxide (Al_2O_3). They found that treated PEEK specimens showed higher shear bond strength with veneering composite than nontreated PEEK specimens.

In another study, Parkar et al.[6] assess the surface roughness (SR) and shear bond characteristics (SBC) of PEEK luted with self-etch resin cement and resin-modified glass ionomer cement after surface treatments with 98% concentrated sulfuric acid, 110 µm alumina particles and 10–20 µm synthetic diamond particles. They found that SR and SBC of specimens treated with concentrated 98% sulfuric acid were the maximum. In this study, 100% of the samples showed a mixed type of failure. A similar result was obtained by Stawarczyk et al.[7] and they also found that PEEK specimens etched with sulfuric acid showed higher surface free energy and SR than specimens without pretreatment or etching with piranha acid when bonded to veneering resin.

Adem et al.[8] assess the shear bond strength of composite resin to PEEK after mechanical and chemical surface treatments. They also found that the mean shear bond strength values of the sulfuric acid-etched group were higher than the airborne particle abrasion plus acid etching, airborne particle abrasion alone, and control group. Attia et al. [1] evaluated the effect of different surface treatments on the pushout bond strength of milled PEEK posts to resin cement. They also found that surface treatment of PEEK posts with 98% sulfuric acid for 60 seconds showed significantly higher bond strength values than airborne particle abrasion by using 50 µm Al_2O_3, nonthermal plasma treatment, and no treatment groups.

The current evidence suggests that the surface treatment of PEEK with chemical and mechanical methods does increase the bond strength of the PEEK with resin cement/layering composite resin. The bond strength in most of the studies increased when PEEK was treated with sulfuric acid. Most of the studies done were in vitro studies, so it's too early to come to any conclusion, so more clinical trials were needed to establish any fact on the bond strength of PEEK with resin.

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How to cite this article: Mishra SK, Chowdhary R. Current Evidence on the Bond Strength of Surface-treated Peek with Resin. Int J Prosthodont Restor Dent 2022;12(2):51–52.

Source of support: Nil

Conflict of interest: None

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