



**“AN IN VIVO STUDY TO ASSESS THE INFLUENCE OF SURFACE
ROUGHNESS ON BACTERIAL ADHESION IN POLYETHER ETHER
KETONE (PEEK).”**

By

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Background: Polyetheretherketone (PEEK) is a thermoplastic resin employed in the field of industry and medicine since several years. The unique properties of the material allows the use of PEEK as implant abutments and as a framework material for removable and fixed denture prosthesis. Bacterial adhesion shows a direct positive relationship with surface roughness. Surface roughness is only one of the parameters involved in plaque formation. Surface irregularities of intraoral prosthesis initiates colonization of bacteria. Though a lot of studies are present on the mechanical properties of PEEK, there is scanty literature on the interaction between PEEK and oral microflora. Thus, the need for the study is to assess influence of surface topography on bacterial adhesion in polyetheretherketone (PEEK) discs intraorally.

Method: Ten patients were selected between the ages of 19 and 27 years with excellent systemic health. Ten discs (five test and five control) were analysed for surface topography using Scanning Electron Microscopy. The surface roughness was evaluated using an optical profiler. In each of the subject, a removable acrylic device was adapted to the molar-premolar region of each quadrant on one side. PEEK discs were glued to the buccal aspect of each device using Ufi gel soft liner. One device was inserted in the right quadrant of the maxilla and another in the right quadrant of the mandible. After 24 hours, both the discs were retrieved, placed in Phosphate Buffer Saline (PBS) and processed for microbiological study to evaluate portion of the surface covered by bacteria. After this, gram staining was carried out to identify the strain of bacteria. Furthermore, the surface topography of the material was evaluated by SEM.

Results: The surface roughness of PEEK discs were found to be $0.2 \pm 0.7 \mu\text{m}$. The colony count in the PEEK discs that were inserted in the maxillary vestibule was found to be about 3082.500 ± 2104.373 CFU/ml and those inserted in the mandibular vestibule was found to be about 2845.500 ± 2072.669 CFU/ml. On gram staining, gram positive cocci were the predominant organisms. Scanning Electron Microscopy revealed an increase in surface irregularities and presence of microbial colonies.

Conclusion: To conclude, according to this study PEEK may be currently a suitable material with a low colonisation potential.