Elemental, Morphological, and Corrosion Characterization of Different Surface States of Co-Cr Alloy for Prosthodontic Applications

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In this study, four different groups were prepared in a cast model of an arch that received four implants made with a Co-Cr dental alloy. The surface of each group was prepared by four different surface treatments, including sandblasting with Al₂O₃ grains (SB), conventional finishing with dental burs (CF), milling with a CAD/CAM device (MIL), and electrodischarge machining (EDM). The characterization of the roughness parameters, morphology, elemental composition, and electrochemical properties of a dental Co-Cr alloy in different surface states exposed to an oral environment were reported. The electrochemical properties were tested with open-circuit potential (OCP) and anodic scan in Ringer's solutions. The results of roughness parameters, elemental composition, OCP, corrosion potential and pitting potential were statistically analyzed by one-way ANOVA and the Tukey-Kramer multiple-comparison test at 95% confidence level. The roughness parameters classified the surfaces from smoothest to roughest according to the following order; CF,

MIL, EDM, and SB. The CF group has the best corrosion resistance followed by the EDM, MIL, and SB groups.

Keywords: Co-Cr alloy, corrosion, profilometry, SEM/EDX, surface roughness

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