COMPARATIVE ANALYSIS OF THE PHYSICAL PROPERTIES OF THE VENEERING MATERIALS FOR TITANIUM COPINGS: AN IN-VITRO STUDY

By

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ABSTRACT

Background and Objectives: Good mechanical and physical properties are the basic requirements with materials used as veneering materials over metal substructure as they determine the clinical success of the dental procedure. There are many studies on properties such as wear, surface hardness, fracture strength of the veneering materials over the metal sub-structure, but there are only few studies comparing the properties like shock absorbability (impact value) and fatigue fracture under cyclic loading of the veneering materials over titanium(Ti) copings, which are directly responsible for transmitting forces to the underlying bone. The objectives of this study are to evaluate and compare the shock absorbability and fatigue fracture under cyclic loading of the veneering materials over titanium copings.

Method: Titanium copings of 0.6 mm thickness were veneered with indirect composite and porcelain. For testing the shock absorbability, an impact test was used which measured the magnitude of acceleration – time history, using an accelerometer connected to FFT (Fast Fourier Transform) analyzer. The impact value reflected the shock absorbability provided by the veneered material over titanium coping. A total of 20 samples (n=10) were evaluated. For testing the fatigue fracture, a customized cyclic loading machine was used on which the acrylic die with cemented porcelain/composite bonded to titanium coping, was positioned in such a way that the vertically oscillating tip of the tool would hit the centre of the cemented porcelain/composite bonded to titanium coping till it fractures. A total of 20 samples were tested (n=10). The findings were statistically analyzed using student t-test.

Results: There was statistically significant difference seen in the impact values and fatigue fracture under cyclic loading for composite / porcelain veneered to titanium copings.

Interpretation and conclusion: The present findings suggest that shock absorbability (impact value) of indirect composite over titanium coping is higher than the porcelain veneered to titanium. Whereas the number of cycles required fracture (fatigue fracture) is higher for porcelain veneered to titanium than indirect composite veneered to titanium.

Keywords: titanium, indirect composite, porcelain, veneer, shock absorbability, cyclic loading, fatigue fracture.