A COMPARATIVE STUDY ON SURFACE CHANGES BETWEEN COMPOSITE VENEER AND ACRYLIC RESIN USING BATTERY-OPERATED TOOTHBRUSH AND MANUAL TOOTHBRUSH

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Abstract

Early forms of toothbrush have been in existence since 3000 BC. Several changes have happened since then, it has evolved from a ‘chew stick’, into a bristle toothbrush, then a battery-operated toothbrush. Tooth brushing has been our primary way of cleaning the oral cavity and its structures to maintain good oral hygiene. However, prolonged brushing can be abrasive to one’s existing restoration and prosthesis increasing the surface roughness, leaving the resins vulnerable to damage and plaque accumulation. This study aims to evaluate the effect of tooth brushing using a manual toothbrush and a battery-operated toothbrush to the surface roughness of composite resin restorations and denture base acrylic resin. Composite specimens and denture base acrylic specimens showed varying wear and surface roughness with several variables taken into consideration such as brushing force, brushing stroke, dentifrice, type of bristle, and type of toothbrush used. The expected result is that the specimens brushed using the battery-operated toothbrush with applied toothpaste will have greater wear and surface roughness.

Research Objectives

The importance of this study will give us another perspective of the long-term effects of tooth brushing. There is no doubt that regular brushing of the teeth is the main factor in maintaining the health of the oral cavity. When done properly and regularly, it reduces the chances of having complications such as oral and systemic diseases. However, excessive and forceful brushing of teeth may eventually lead to damaging and scarring of the surface of the composite veneer restorations and heat-cured acrylic resin.

As much as the people want to maintain and preserve having a natural set of teeth, sooner or later, it will decay. Tooth restoration will likely be a treatment made when consulting to a dental professional; even so, it has its own limitations. Brushing gone wrong may contribute to bacteria build up as it leaves the surfaces of teeth and restorations vulnerable and damaged. As a result, the lifespan of the composite is shortened and might be the cause of failure of the dental treatment.

This study will help dental professionals in explaining to patients the different possible causes of the failure of a treatment and a better post-operative instructions and reminders. This study
will also challenge manufacturers of dental materials in introducing and producing better composite products that are still cost-effective, biocompatible, and easy to manipulate.

**Methodology**

The researchers will utilize the experimental method of research. This method will use for its applicability to the study and to present the result of the study. The researchers will fabricate blocks of acrylic resin (25x25x25mm) and another blocks of composite resin (10x3x5 mm). Eight blocks (4 blocks of acrylic and 4 blocks of composite) will be prepared. It will be divided into two groups according to the two types of resins used. Tooth brushing was performed 60Hz with 10 strokes of brush per arch by reciprocating abrasive machine at a force of 200 grams. Surface roughness will be evaluated using a SEM (Scanning Electron Microscope) and the weight loss will also be measured.

**Results**

The electric toothbrushes caused significantly higher surface abrasion on composite resin and heat-cured acrylic resin compared to the manual toothbrushes using the same brushing force and time. However, changes on the surface of the specimens were not prominent during the first 4 weeks of brushing. On the eight week, surface changes on both specimens were already slightly visible. Surface changes on the specimens were much noticeable and recognizable on the 12th week.

**Findings**

This study evaluated the effect of two kinds of toothbrushes on composite resin and heat-cured acrylic resin over a simulated long term period. The abrasive effect of tooth brushing on the surface of specimen depends on the direction and frequency of the brushing movement and other factors such as applied force as well as quality and arrangement of the toothbrush bristles. Our results showed that manual toothbrushes was less abrasive than the electric toothbrushes at the same brushing force of 200 grams. Hence, the null hypothesis of this study was rejected.
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