

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.

Keywords: Abrasion, Toothbrush, Resin

I. Introduction

The human oral cavity relates to the mouth and other components including the lips, tongue, teeth, and roof and floor of the mouth. It is a cavity in oval shape with two divisions. First is the vestibule which is the space bordered by the lips and mucus lining of the cheeks in front, and the teeth, gum, and, alveolar processes at the back. Second is the oral cavity proper. It is bordered by the hard palate in the upper front, while the soft palate constitutes the upper back boundary. The tongue fills a huge extent of the cavity of the mouth proper. It is where the first step of digestion – ingestion or food intake – takes place. A human or a normal adult usually has 32 permanent teeth and it is referred to as the hardest substance in the human body. Healthy teeth not only make you feel and look pleasing, they also allow proper phonation and mastication. Good oral health is important to your overall well-being. For swallowing and digestion, human teeth mechanically function to break down food by cutting and crushing it. The teeth tears, breaks, and grinds the food as the person eats, the tongue helps to prepare it into a soft mass to be digested by adding saliva into the food to complete the mechanical digestion of the food. The oral cavity environment therefore encourages the development, accumulation and deposition of biofilm on natural dentition surfaces that is known as the dental plaque. Plaque is a sticky, colorless film of bacteria and sugars that constantly builds up on the surfaces our teeth. It is the one of the major causes of cavity and gum disease and, if not removed daily, can harden into tartar. Another cause of teeth problems is the bacteria called *Streptococcus mutans* which is another contributing factor for having tooth decays. As hard as it can be, the teeth are also susceptible to bacteria especially when proper oral hygiene is neglected.

Restoring the lost natural dentition of a patient is one of the major concerns of dentistry today. Generally, younger individuals have a lot of insecurities to cope with when it comes to their physical appearance. Anything that makes them different from others can greatly affect their confidence and self-esteem. In recent years, to address such issues, most dental practitioners have preferred more conservative and esthetic methods, such as restorations by direct and indirect laminate veneer. Dental veneers are thin shells of porcelain or composite resin custom produced to fit over teeth, giving a natural, appealing appearance. Chipped, stained, misaligned, worn down, irregular crown length, or abnormally spaced teeth can be fixed with composite veneers. Composite resin and porcelain are the two most prevalent materials used in dental veneers. Dental

veneers bond with resin cement to the teeth. On the other hand, tooth loss can happen at any age. Because of gum disease and tooth decay, young or old, anyone can lose their teeth. Dentures offer a low-cost alternative and long-term solution free of pain and worry, whatever the cause of the problem. Dentures are custom-made substitutions for missing teeth and can either be fixed or removed out and put back into your mouth. Replacing missing teeth will make the smile better and can enhance someone's physical looks. A study shows that the Philippines has the highest number of denture wearers in Southeast Asia 1 in 3 adults or heady 30 million Filipinos. But what's more surprising is that almost half of the denture wearers are aged 18 to 34 –also known as the millennial or Gen 2 cluster.

II. Literature Review

According to Soares, et al., Good appearance is not considered a vanity sign, but literally a need, and the dentistry has a fundamental role in obtaining it, since the face is the exposed area of the body and the mouth a prominent line. The smile constitutes an important component in the presentation of a human being favoring his or her social acceptance. A non-harmonic smile decreases the beauty of the face and it can cause discomfort in the social conviviality, as it is one of the most important facial expressions that demonstrates friendship, pleasant sensation and appreciation. Esthetics in dentistry has increasingly become a major concern for the patients and often serves as a reason for seeking dental care.

Surface quality of restorations is in fact one of the important factors that determine their clinical success. a smooth surface can improve longevity and esthetics of restorations by reducing plaque accumulation and surface staining, allowing successful mimicking of the tooth's natural appearance.

Toothbrushing is the most commonly recommended and used method of cleaning the oral cavity and its structures. Maintaining one's oral hygiene is very important. Brushing is done by scrubbing the teeth using a toothbrush which is effective when used with toothpaste. Interdental cleaning is useful together with toothbrushing. This is done with floss or an interdental brush. These are the primary means of cleaning teeth.

There are those manual and electric varieties. Both have been shown to be effective and it's just a matter of preference. Although there is no evidence to which is more effective, most articles say that electric tooth brushing is better in a way that it has an oscillatory motion that lacks in manual toothbrushes. Both are effective.

III. Methodology/Materials

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.

IV. Results and Findings

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.

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.

V. Conclusion

The researchers therefore conclude that the surface abrasion was measured higher for electric toothbrush than manual toothbrush. Composite resin and heat-cured acrylic resin were more abraded when brushed with an electric toothbrush.

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