

# Chapter 1

## INTRODUCTION

### 1.1 Background

Almost every veneer restoration are using ceramic materials because of its characteristics such as wear resistance, biocompatibility, color stability, and natural light transmission (Morimoto et al., 2016), however, due to the time-consuming, many prolong appointments, difficulties in repairing and not to mention the high cost, it is not an option in several cases (Albanesi et al., 2016). As a consequence, the resin-based composite veneer has been developed to fill in the voids in terms of economic efficiency and less chair time needed (Perdigão et al., 2014). Furthermore, some veneer's luting agents are also made of resin composite, so there is no problem in achieving compatible adaptation or requires any specific dental aided chemicals as porcelain veneer restoration does (Albuquerque et al., 2018). Many evidences have proved that direct veneer has pretty high survival rate. From a study conducted by Demirci et al (2015), 147 direct nano-resin laminate veneer were investigated which ruled out the survival rate of Filtek Supreme XT (3M ESPE) using Scotchbond Multi-Purpose Plus (3M ESPE) bonding system was 92.8% and Ceram X duo using XP Bond (Densply DeTrey) was 93% after 4 years in placement.

Other than Filtek Supreme XT (3M ESPE) and Ceram Duo (Densply DeTrey) mentioned above, direct veneer materials have been far more developed. There are two innovative nano-hybrid composite restorations introduced to the market: G-Aenial Universal Flo (GUF) (GC, Japan) and Compoener (Coltene; Altstätten, Switzerland). Both are praised for their brilliant aesthetic that can mimic the natural teeth's appearance. Based on the manufacturer's guide, G-Aenial Universal Flo (GC, Japan) can achieve optimal filler silanization along with uniform filler dispersion for strength improvement while still having low viscosity. The manufacturers claim G-Aenial Universal Flo is “the first injectable composite eligible for the complete restoration of all cavities” (G-Aenial Universal Injectable from Technical Manual, ver 1.0, 2018). It is stand out in the market not only for its aesthetic color serving in anterior restorations including direct veneer but it also has good strength and wear resistance for posterior restorations. G-Aenial Universal Composite contains methacrylate monomer 31% with UDMA, Bis-MEPP, and

69% nanohybrid filler particles. From a study, GUF was praised for its innovative silane treatment that enhances hydrolytic stability and filler-matrix integrity (Karadas M, and Demirbuga S, 2017). With all those characteristics, G-Aenial Universal Flo Composite is trusted for its strength, aesthetic, and color stability. Many direct veneer cases have successfully done by this material using a mock-up technique (Terry, 2017; Terry, Powers, and Blatz, 2019).

Eventhough Componeer is prefabricated, it is proven as fine as other Hand-layered veneer (HLV) material such as Tetric N-Ceram (Tasin, 2019) with the advantage of requirin less hand-skill. Based on a study by Albuquerque, Nishida and Francci (2019), both prefabricated veneer Brilliant New Generation and Brilliant Everglow from Coltene performed better than Filtek Supreme XTE (FXT) (3M ESPE). The researcher suggested the monomers and the inorganic content's refractive index of the composite has optimized the degree of the conversion leading to higher color stability due to tightly and precisely controlled temperature pressure and light under laboratory conditions (Tasin, Celik, Ismatullaev, and Usumez, 2019). It has received quite recognitions for its convenience and aesthetic but there are not many pieces of research have been done on this material.

However, discoloration is recognized as one of the major reason why people change their resin composite veneer restorations (Kacharaju, 2019). There are two main causes which can result discoloration: intrinsic factors affected by physicochemical characteristics such as resin matrix, deep of cure, shade, degree of conversion, photoinitiator, water absorption, filler particle size, and degree of polymerization; extrinsic factors including staining beverage, and alteration on the surface (Kacharaju et al., 2019; Arregui et al., 2015; Saron et al., 2017). Most veneers exposed to certain staining agents in daily activities including drinking beverages or eating sour food. As a consequence, it unavoidably destroys the initial color of the veneer. Besides looking for the most aesthetic materials, finding a stable material, which can survive the unfavorable environment, is essential. There is an evidence that coffee has the most influenced in color changing of all composite materials (Kacharaju, 2019). Due to these problems, researchers want to evaluate color stability of different new nano hybrid composite materials used in direct veneer restoration after immersed in acidic (coffee) for four

weeks. Since coffee and water are commonly consumed in our daily life. Four weeks immersing continuously is similar to 2.5 years of clinical lifetime respectively as 24 hours staining in viro equals to one month clinically (Ertas et al., 2006; Kacharaju, 2019).

## **1.2 Problem**

Is there any differences between the color stability of G-Aenial Universal Flo composite and Componeer prefabricated veneer composite material after being stained by coffee?

## **1.3 Aim**

General Purpose: This study aims to compare the color stability ( $\Delta E$ ) of nanohybrid material of flowable nanocomposite (G Aenial Universal Flo, GC, Japan) and prefabricated composite resin veneer (Componeer, Coltene).

Specific purpose:

For a veneer to be used in a long time, color stability is one of the key factors. Therefore, the specific aims for this study included:

- (1) to evaluate the color stability of GUF and Componeer nano-hybrid composite materials after immersed in coffee.
- (2) to see the differences in color change between the two materials.

## **1.4 Hypothesis**

Null hypothesis: there is no significant difference in color stability between G-Aenial Universal Flo and Componeer.

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