بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

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تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

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"Effect of multiple firing on the color stability, translucency and flexural strength of Amber®Press and Amber®Mill"

Thesis

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INTRODUCTION

There is a high demand for natural teeth appearance these days. For this reason, ceramic systems which are metal free restorations of a high aesthetic quality are becoming more popular. In the past couple decades, the development of all-ceramic systems for dental restorations has been extraordinary. Different types of heat pressed ceramics were introduced as the first generation of heat-pressed dental ceramics contains leucite as reinforcing crystalline phase and the second generation was lithium disilicate-based(1).

Lithium disilicate is one of the high aesthetic restorations with high-strength that can be conventionally cemented or adhesively bonded(1). Lithium disilicate is a material that can be used in all areas of the mouth, when specific considerations are taken into account. For laboratory ceramists, the versatility and performance of lithium disilicate enables them to optimize their productivity, since it can be fabricated by either lost-wax pressing or CAD/CAM milling techniques(2).

Amber mill and Amber press one of newly introduced lithium disilicate ceramics, they characterized by their Aesthetic values, Structural stability and edge stability.(3, 4)

Lithium disilicate glass ceramic has high esthetic and strength properties which allows it to be a core for a veneered restoration or for full contour restoration fabricated from one high-strength ceramic.(5). It is composed of quartz, lithium dioxide, phosphor oxide, alumina, potassium oxide, and other components. Pressed ceramics have a composition that produces a highly thermal, shock-resistant glass ceramic because of the low thermal expansion that occurs when it is processed [2]. The pressable lithium disilicate is produced using a unique bulk casting production process to create the ingots. The microstructure of the material consists of approximately 70% needle-like lithium disilicate crystals embedded in a glassy matrix. These crystals are approximately 3 um to 6 um in length[6]. All-ceramics contain a higher amount of crystalline phase, from about 35 to about 99 vol %. This higher level of crystals are responsible for an improvement in mechanical properties through various mechanisms, such as crystalline reinforcement or stress [1]. The other type of lithium dislicate is a pin-type lithium disilicate that requires grinding in a wet environment.

Multiple firing is required to improve contour, color, and esthetics of all-ceramic restorations when using the layering technique to match the esthetics of the natural dentition[7]. Therefore, studying effect of multiple firing on color stability, translucency and flexural strength of ceramics could be of value.

REVIEW OF LITERATURE

Ceramics:

The word Ceramics is derived from the Greek word "*keramos*" which means potter's clay[8]. Ceramics were used in the ancient art of fabricating pottery where clay was fired to form a hard but brittle object. A modern definition is a material that contains both metallic and non-metallic elements. Porcelain on the other hand is a ceramic that consists of a glass matrix phase and crystal phase(s)[9]. The glass phase is responsible for esthetics and the crystalline phase is responsible for mechanical strength. According to their phases and microstructure ceramics can be classified according to their microstructure into four groups:[10]

Category 1: glass-based systems (mainly silica)

Category 2: glass-based systems (mainly silica) with fillers, (usually crystalline leucite or lithium)

Category 3: crystalline-based systems with glass fillers (mainly alumina)

Category 4: polycrystalline solids (alumina and zirconia)

Category 1: Glass Based Systems (mainly silica)

Glass-based systems are made from materials that contain mainly silicon dioxide (also known as silica or quartz), which contains various amounts of alumina.

Aluminosilicates found in nature, which contain various amounts of potassium and sodium, are known as feldspars. Feldspars are modified in various ways to create the glass used in dentistry. Synthetic forms of aluminasilicate glasses are also manufactured for dental ceramics.[10]

Category 2: Glass Based System with fillers

In this category, ceramics have large variety of glass- crystalline matrix and crystals with different ratios. Consequently, they can be subdivided into three groups. The difference between the subgroups are the amount of different types of crystals added or grown in the glass matrix. The main types of crystals are leucite, lithium disilicate and flouroapatite. The glass-based system is made from materials that contain silica or silicon dioxide with different amounts of alumina.[1]

***Subgroup 2.1*: Low to moderate leucite containing feldspathic glass**

This material has leucite crystals that are of random size and distribution with the average particle size being around several hundred microns. Leucite inhibits crack propagation and raises the coefficient of thermal expansion of the material which improves the strength of the material[5]. The randomization of distribution and large particle size gives the material low fracture resistance and abrasive properties relative to enamel[11, 12]. Recently, much finer leucite crystals (10–20 µm) have been developed with even particle distribution throughout the glass. Therefore, they are less abrasive and have higher flexural strength[13, 14]. Via electron micrograph, it reveals a glass matrix surrounding leucite crystals. This material is available as powder/liquid and is used for veneering cores of restorations.

***Subcategory 2.2:* High leucite-containing (approximately 50 %) glass**

They are glass ceramics which have a crystalline phase grown within the glass matrix by a process called "controlled crystallization of glass". They have higher resistance to fracture, erosion and thermal shock. They are available in both powder/liquids, Machin able, and press able forms. The most famous glass ceramic is the original IPS Empress. Press able and Machin able ceramics have performed excellently clinically when used for posterior on lays and inlays, anterior veneers and crown restorations[15].