International Journal Dental and Medical Sciences Research
Volume 6, Issue 1, Jan-Feb- 2024 pp 174-176 www.ijdmsrjournal.com ISSN: 2582-6018

In Vitro Evaluation of Surface Characteristics and Bond Strength of Different glass Ceramics Protocol of thesis

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Date of Submission: 10-01-2024 Date of Acceptance: 20-01-2024

I. INTRODUCTION

Ceramic restorations are widely used in dental treatments[1]. They present thermal expansion coefficient compatible to teeth, biocompatibility, resistance to wear, favorable esthetic results and clinical longevity[2]. Technological innovations associated with advances in restorative material have improved production methods and mechanical properties of new materials, affecting their use in dental professional's daily routine [3].

Lithium disilicate glass ceramic has more favorable mechanical properties compared with conventional dental porcelains and has excellent optical properties. Although, the mechanical prOperties of lithium disilicate are inferior compared with zircOnia, it has been considered superior in terms of translucency, with its variety of translucency levels and shades; lithium disilicate can be fabricated as a monolithic restoration with surface characterization [4]; therefore, lithium disilicate has been widely used for esthetic monolithic ceramic crowns [5].

Lithium dislicate ceramic extends the indications of glass ceramics beyond the anterior teeth[8], to inlays, onlays, veneers, anterior and posterior crowns, and implant- supported crowns [1].

Lithium disilicate ceramic can be obtained by heat press technique based on the lost wax technique[8,9]. In addition, partially pre-crystallized blocks have been introduced to enable this material to be used with CAD/ CAM technology[1,9]. Regarding its microstructure, topography, roughness and fractal dimension, milled lithium disilicate ceramics is smoother and more homogeneous, and has greater topographic feature complexity than the material that is used with the pressed technique[9] ,on the other hand press technique demonstrated a significantly smaller marginal gap than the CAD/CAM technique [10.]

Results from clinical studies have demonstrated that lithium disilicate ceramic has tO be bonded if conservative tooth reduction of 1.0 to 1.5 mm or 1.5 tO 2.0 mm is considered the ultimate clinical goal [6,7], the micromechanical bond is established through mechanical interlocking of the ceramic intaglio surface with the bonding substrate, which is either an adhesive or the resin cement. For this purpose, the amorphous glass matrix is removed usually by means of hydrofluoric acid, exposing an irregular microstructure of the embedded crystalline structure. The adhesive or cement can then penetrate the surface irregularities and porosities, where it remains locked in after polymerization[11.]

Lithium disilicate ceramic requires final adjustment before permanent fixation of the restoration, resulting in a rough surface [12,13], rough surface can lead to partial chipping or fracture and affect the strength of the ceramic, previous study reported that the fracture strength of IPS e.max Press decreased with increasing surface roughness[14] ,Moreover Polished surfaces provide little retention for bacteria and thus reduce the exposure to plaque formation and prevent adverse effects on periodontal tissues [15,16]in addition to that smooth surfaces are less likely to stain and avoid negatively impacting the esthetic results[17,18] .

Polishing or glazing are used to restore the smooth and shiny surface of the restoration; reglazing involves repeated firing in the dental laboratory, which requires more patient visits. Polishing is an easy way to establish a smooth surface in a single visit. There are many polishing modalities used to polish restorations. Previous studies reported that polishing produces as smooth or smoother surface, and gave a higher gloss and higher translucency compare with glazing [19,20].

Recently novel lithium disilicate ceramics have been introduced to the market using various methods of fabrication. Their ultra-structural properties, the influence of processing techniques, and their performance are not well known [11].

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Aim of the study
This **In-vitro** study will evaluate surface topography and bond strength of different lithium disilicate ceramics

II. MATERIALS AND METHODS

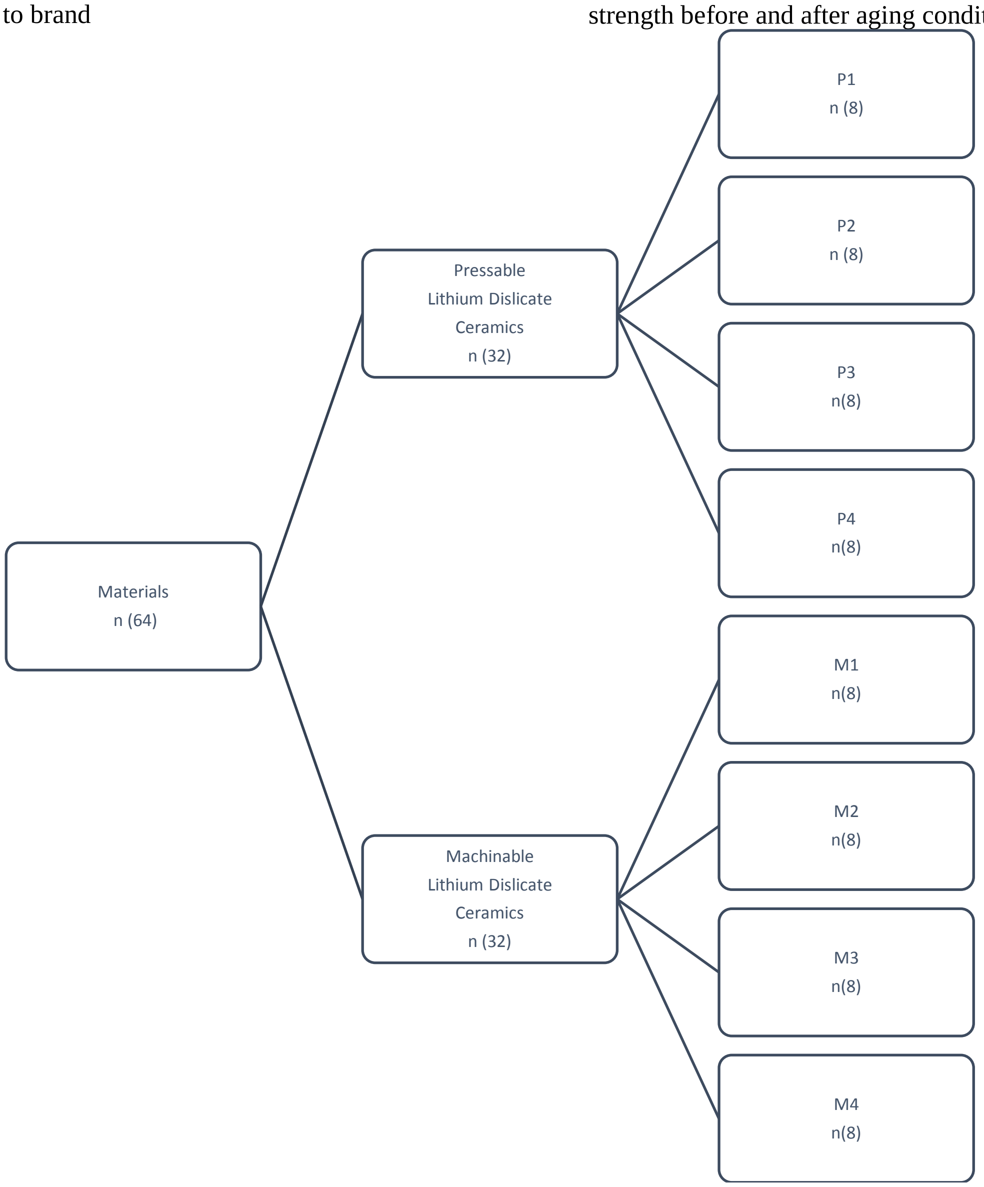
Materials:
1. Pressable Lithium Disilicate.
2. Machinable Lithium Disilicate.
3. Etch and rinse resin cement system.

Methods:
64 blocks will be fabricated including 2 main groups according to manufacturing techniques

Group (1) Pressable Lithium Dislicate Ceramics
Divided into 4 subgroups (P1, P2, P3, P4) according to brand
Subgroup (P1) Lithium disilicate brand (P1) (control group)
Subgroup (P2) lithium disilicate brand (P2)
Subgroup (P3) lithium disilicate brand (P3)
Subgroup (P4) lithium disilicate brand (P4)

Group (2) Machinable Lithium Dislicate Ceramics
Divided into 4 subgroups (M1, M2, M3, M4) according to brand
Subgroup (M1) Lithium disilicate brand (M1) (control group)
Subgroup (M2) lithium disilicate brand (M2)
Subgroup (M3) lithium disilicate brand (M3)
Subgroup (M4) lithium disilicate brand (M4)

- Blocks will be used to evaluate surface topography before and after aging conditions
- Blocks will be also used to evaluate bond strength before and after aging condition



III. CONCLOUSION

Different lithium dislicate ceramics have different bond strength and different surface topography.

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