CHAPTER I

INTRODUCTION

1.1 PRINCIPLES, THEORIES AND RATIONALES

Dental porcelain is a popular restorative material used for crowns, veneers, and bridges. Clinically, orthodontists are often faced with the difficulty of bonding metal brackets to porcelain surfaces. Since conventional acid etching is ineffective for etching porcelain surfaces for retention of orthodontic brackets, mechanical or chemical pre-treatment is essential for direct bonding to porcelain surfaces.[1,2]

In previous studies, different methods and combinations of methods are recommended.[2-9] Mechanical roughening of the surface with diamond burs and sandblasting are reported to provoke cracks within the ceramic.[2,10] Chemical conditioning with hydrofluoric acid also has been recommended to bond brackets to the porcelain surfaces.[11-16] However, hydrofluoric acid has been found to be a harmful and irritating compound for soft tissues.[7] Organosilane coupling agents also have been recommended to increase the bond strengths of brackets to porcelain surfaces.[2,4] Several studies[2,10,17-21] have reported silane treatment may produce acceptable bond strength for clinical success. The issue of bond reliability using organosilanes has been of concern and some studies show that application of silane without hydrofluoric acid or roughening the surface did not give sufficient bond strength to withstand occlusal force.[4,7,9,13,15,16,22-25]

Although, various surface treatment methods have been recommended, each has some disadvantages and limitations. Resin cements, might be of interest for

orthodontic bonding, since they have the capacity to adhere to ceramic as well as to etched enamel.[26] Little research has been carried out on this material and its potential for bonding of brackets to porcelain surfaces. It would be of interest to determine which adhesive system produces acceptable orthodontic shear bond strength to porcelain surfaces.

1.2 PURPOSES OF THE STUDY

The purposes of this study were

1. To measure and compare the shear bond strength values of five different adhesive systems when used to bond orthodontic metal brackets to porcelain surfaces
2. To describe the modes of bond failure after de-bonding the brackets among the groups of five different adhesive systems

1.3 HYPOTHESIS OF THE STUDY

There is no statistically significant difference in mean shear bond strength value among five adhesive systems in orthodontic bracket placement to porcelain surfaces.

1.4 ANTICIPATED BENEFITS

1.4.1 This study should suggest which adhesive systems provide acceptable bond strengths when used to bond orthodontic metal brackets to porcelain surfaces in clinical practice.

1.4.2 The availability of these suggested systems may serve as the basis for future studies.

DEFINITIONS

Adhesive

A material used to produce adhesion

Adhesive failure

A failure of the interface between the bracket and adhesive or of the interface between porcelain surface and adhesive

Bond

The linkage between two atoms or radicals of a chemical compound

The force that holds two or more units of matter together

Cohesive failure

A failure within the composite resin, within the enamel or within the bracket

Ceramic

An earthy material, usually a silicate nature and may be defined as a combination of one or more metal with a non-metallic element

Dental porcelain

A type of ceramic used in dental restorations, either jacket crowns or inlays, artificial teeth, or metal-ceramic crowns

Shear bond strength

The maximum force per unit area that opposes the sliding of one plane of a material on an adjacent plane in a direction parallel to the force