CHAPTER I

INTRODUCTION

Principles, Theories, and Rationales

Excessive fluoride ingestion during tooth formation leads to dental fluorosis.[1] The features of fluorosis vary from white lines in the enamel to chalky , pitted and discolored enamel.[1,2] The main factor causing dental fluorosis is excess fluoride in drinking water. Endemic fluorosis results from the ingestion of excessive quantities of fluoride, usually in drinking water. There are well known endemic areas in Europe, in Africa: Kenya, Tanzania, Uganda, Ethiopia and Sudan; in America: Canada, United States of America and Argentina; and in Asia: India, China, Japan, Saudi Arabia and Thailand.[3,4] The geological features of Northern Thailand include mountains and forests with abundant mineral resources, including fluoride.[5,6] So, a high prevalence of dental fluorosis is found in this area.[6]

In its mildest forms, enamel fluorosis appears as loss of marginal translucency, faint white flecks, spot or striations. With increasing severity, white flecks or striations enlarge and may merge. In severely fluorosed teeth, hypomineralization extends towards the dentine-enamel junction, and the teeth may be subject to extensive post-eruptive surface breakdown and post- eruptive dark brown to black staining that creates an esthetic dental problem. The damage to the surface enamel probably increases the risk of retention of the microbial deposits associated with the

development of dental caries. Therefore, such damaged teeth may be more susceptible to caries than healthy teeth.

Some people in Northern Thailand need orthodontic treatment. There are reports that it is difficult to bond orthodontic brackets to fluorotic teeth and there is a notable clinical failure rate for bonding to such teeth.[7] Many techniques have been suggested to resolve this problem, such as micro-abrasion of fluorotic enamel, incorporating enamel etching; grinding the enamel surface; or applying light-cured resin veneers. However, there are many disadvantages to these techniques, such as damage to the enamel surface, allergy and increasing chair time and costs.[7-9] It should be beneficial to find an alternative adhesive system for teeth with fluorosis.

Purposes of this study

1. To measure and compare the shear bond strength of different adhesive systems for bonding orthodontic brackets to fluorotic teeth.
2. To describe the mode of bond failure after debonding the brackets among the different adhesive systems

Hypotheses

1. There is no statistically significant difference in mean shear bond strength between fluorotic and normal teeth.
2. There is no statistically significant difference in mean shear bond strength among three different adhesive systems in orthodontic bracket placement.

Anticipated benefits

1. To find an alternative adhesive system to replace the conventional phosphoric acid adhesive system used in orthodontic bracket placement for fluorotic teeth.

2. To gain information on optimal adhesive systems for bonding orthodontic brackets to fluorotic teeth for further research 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 enamel 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.

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 without causing a fracture.

Fluorotic teeth

The hypomineralization of the enamel cause by continuous ingestion of excessive fluoride during enamel formation