# CHAPTER 1

# INTRODUCTION, AIM AND OBJECTIVES

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## 1.1 Introduction

Resin composites have been available in the dental market for about five decades. Resin composites are popular as aesthetic anterior restoratives and as a dominant alternative to amalgam for direct restoration of posterior teeth (Whitters *et al.*, 1999). Composites are also currently one of the most widely used in a variety of clinical situations because of their sealing capability when use appropriately with bonding agents.

All restorative materials including composites are exposed to water, saliva and chemicals in dental plaque, food and drinks with different temperature and pH and oral hygiene products in the oral environment. The satisfactory clinical performance of composites is determined by their resistance to degradation in the oral environment. Surface degradation and softening of composites when exposed to various chemicals and water have been proven by previous studies. Water can cause hydrolytic degradation and chemicals may affect the surface hardness of composites. Wu and McKinney (1982) showed that wear resistance of composites were significantly lower when immersed in chemicals such as pure cyclohexanone and ethanol–water mixture with different concentration. These chemicals soften the BIS-GMA matrix copolymer. Asmussen (1983) later found that not only ethanol but acetic and propionic acid have softening effect on BIS-GMA-based polymers.

The wear of the composites increased as the hardness decreased after the composites were plasticized in a chemical medium such as ethanol. Previous studies (Wu and McKinney, 1982 and Asmussen, 1983) have shown that alcohol-containing products

can affect selected physical properties of composite restorative materials. Chemicals such as ethanol can be found in the mouthrinses. It has been proven that mouthrinses containing alcohol and alcohol-free are equally effective for antimicrobial and anti gingivitis effect (Borrajo *et al*., 2002), but alcohol containing mouthrinses is still widely used. Although an earlier study by Wu and McKinney (1982) suggested that chemicals such as ethanol had a softening effect on composite restorative materials, no definite conclusion can be drawn from studies on alcohol-containing mouthrinses (Gurgan *et al*., 1997, Gurdal *et al*., 2002 and Yap *et al*., 2003).

## 1.2 Aim

The aim of this study is to determine the surface microhardness of selected composite restorative materials after immersion in various types of mouthrinses.

## 1.3 Objectives

1.3.1 To compare the surface microhardness of a microhybrid composite, Spectrum TPH and nanocomposites namely Filtek Z350, Ceram•X Mono and Ceram•X-Duo-enamel shade.

1.3.2 To compare the surface microhardness of these composites after immersion in alcohol containing mouthrinse (Listerine), alcohol-free mouthrinse (Oral-B), experimental herbal mouthrinses based on plant extract (mouthrinses X, Y and Z) and distilled water.

1.3.3 To determine whether microhardness of composites is material or mouthrinse dependent.

## 1.4 Null Hypothesis

Mouthrinses does not cause softening of dental composites.