## 1.1 Introduction

Composite resins were introduced in the 1960s for restorations of anterior teeth. Since their advent, they have undergone significant development, which continue to improve their longevity. However, despite vast improvements which have expanded indications for their use, present day resin composites still have shortcomings limiting their application. Inadequate resistances to wear (loss of anatomic form) under masticatory function and microleakage due to polymerization shrinkage are often cited as being their main problems (Peutzfeldt, 1997).

A restorative material should create an adhesive bond with the tooth to eliminate the detrimental effects of microleakage such as hypersensitivity of the restored tooth, marginal staining and discolouration, secondary caries, pulp pathosis, and loss of restoration. Advances such as acid etching and bonding agents have improved the marginal adaptation of the composite resins. The improved marginal adaptation however may be offset by the polymerization shrinkage and high coefficient of thermal expansion of the resins. As a result of polymerization shrinkage, substantial gaps occur at the restoration-dentine interface (Asmussen & Jorgensen, 1972). The coefficient of linear thermal expansion of composite resins is three to four times that of the surrounding tooth structure. Changes in the oral temperature also can affect the adaptation between the restoration and tooth and thereby allow percolation at the restoration-tooth interface (Lee & Swartz, 1970).

Sarrett et al (2000) highlighted the fact that a composite material can perform well in one patient but may degrade, wear and fracture prematurely in another. They attributed the differences among patients to a variety of factors including occlusal bite forces, parafunctional habits such as clenching/bruxism, diet, saliva and plaque composition.

Micro defect analysis of clinically worn composites revealed extensively damaged layers on both occlusal contact and contact-free areas (Wu et al, 1984). The result stipulates that the intra-oral degradation of composites cannot be attributed to mechanical factors alone, but involves chemical degradation as well. Subsurface material damage was attributed to the softening and possible removal of portions of the polymatrix by certain chemicals present in the oral environment (Wu et al, 1984; Kao, 1989; Yap et al, 2000).

The restoration's environment is also of paramount importance in determining the extent of microleakage. In the oral cavity, restoration and surrounding are subjected to mechanical loading and temperature variation and are in contact with food, saliva and microorganism (Trowbridge, 1987).

The pH of oral saliva ranged at 5.2-6.2 in unstimulated (resting) condition and 6.5-8.0 in stimulated condition (Jenkins, 1978). The acidity or alkalinity of fluid in the oral cavity as measured by pH varies from around pH 4 to pH 8.5, whilst the intake of acid fruit juices or alkaline medicament can extend this range from pH 2 to pH 11 (McCabe & Walls, 1998). The changes in this pH do affect the teeth condition and some restoration material.

Previous studies, reported the relationship of the pH and wear resistance of resin materials (Chadwick et al, 1990), surface hardness, compressive strength, solubility and surface integrity after the immersion in acidic soft drinks (Abu Bakr et al,2000), however there was lack of previous microleakage studies that assess the relationship of microleakage and difference pH.

## 1.2 Aim of the study

The purpose of this *in-vitro* study was to evaluate the effects of different pH on microleakage of the Class V composite restoration.

## 1.3 Objectives of the study

1. To evaluate and compare the effect of acidic pH on microleakage of composite restorations.
2. To evaluate and compare the effect of alkaline pH on microleakage of composite restorations.
3. To study the pattern of microleakage at the occlusal and cervical margin of Class V composite restorations.

## 1.4 Null Hypothesis

Null hypothesis for the study was different pH had no effect on microleakage of Class V composite restoration.