CHAPTER I

INTRODUCTION

1.1 RATIONALE

After dentin was exposed, it becomes permeable to oral environment and may sensitive to many forms of stimuli. The change of temperature or osmotic pressure induces the expansion and contraction of fluid in dentinal tubules which affects the sensitivity of exposed dentin. The bulk flow of fluid during expansion and contraction as described by hydrodynamic theory, influence the nerve ending in dentinal tubule to discharge the nerve impulse resulting in dentin sensitivity which is a form of dental pain (Garant, 2003). The sensitive dentin appears to have more dentin permeability. The more opening and the larger diameter of dentinal tubules also detected (Pashley, 1985).

Studies on dentinal fluid flow from exposed dentin of the teeth have been widely reported using different measuring techniques (Bharali LA *et al.*, 1988, Vongsavan and Matthews, 1992, Ciucchi *et al.*, 1995, Itthagarun and Tay, 2000, Kerdvongbundit *et al.*, 2004). Vongsavan and Matthews (1992) demonstrated dentinal fluid flow in cat dentin by using the hydraulic apparatus measuring the movement of fat droplets in a glass capillary while Ciucchi and his colleagues (1995) measured the fluid movement across the dentin in human premolar by containing an air bubble in the fluid system. Those techniques are rather technique sensitive and complicate to set up in the dental clinic.

Replica technique is another nominated technique to demonstrate fluid flow from exposed dentin. The method features is ease to set up and suitable for use in the clinic. Bharali *et al.* (1988) studied the innervations of sweat glands in the rat hind paw and found the replica technique using dental impression material is useful in recording the sweat droplets from the rat hind paw. In 2000, Itthagarun and Tay evaluated dentin fluid of anesthetized vital human permanent molars using replica technique. Teeth were separated into 2 groups: group 1 without vasoconstrictor and group 2 with vasoconstrictor. Fluid exudation was found from group 1 but not from group 2. The authors concluded that anesthetic containing vasoconstrictor caused the reduction of dentin fluid by reducing intrapulpal pressure and/or reversing pulpal flow direction. This technique was used by Kerdvongbundit and colleagues (2004) to study the properties of fluid emerging from exposed dentin of permanent teeth. A hydrophobic silicone rubber material is used to record dentinal fluid from exposed dentin then replicate the impression with epoxy resin. Dentin permeability is assessed by measuring the size of droplets on the replicated epoxy resin under Scanning Electron Microscope (SEM). They found that with a pressure of 30 mmHg in the pulp cavity, droplets presented and accumulated more rapidly on un-etched dentin than etched dentin.

The use of replica technique to study fluid droplets from primary teeth has no report elsewhere. The purpose of this research are to study the dentinal fluid flow in etched and unetched dentin of primary incisors by applying pressure intradentally in vitro and to study the relationship between the size of fluid droplets while changing intrapulpal pressures. We anticipate that this research may provide benefit

information for dentist in restoring the primary teeth more efficiency and for future research on tooth moisture control and restorative materials development.

1.2 OBJECTIVES

1.2.1 To study the dentinal fluid flow in etched and unetched dentin of primary incisors by using replica technique while applying intrapulpal pressure .

1.2.2 To study the effect of changing intrapulpal pressure on the fluid flow through dentin for providing an additional knowledge for developing bonding agent in the future.

1. 3 HYPOTHESIS

1.3.1 There are emerging of fluid droplets from dentinal tubules of unetched and etched dentin surface while apply intrapulpal pressure.

1.3.2 During varying intrapulal hydrostatic pressure, the size of fluid droplets change corresponding to the applied pressure.