CHAPTER 1

INTRODUCTION

Statement of the problems and objectives

Nitrous oxide/oxygen (N_2O/O_2) inhalation sedation is commonly used in dental patients, who are anxious or uncooperative, to relieve pain and anxiety [1, 2]. There are many causes of anxiety such as injection, loud noise, and vibration from dental instrument. When patients are calm, they can cooperate more with dental procedures.

N_2O/O_2 inhalation sedation is a technique that has been used to manage dental fears and anxieties for more than 150 years. It is used as a part of general anesthesia or singly used for inhalation sedation [3]. N_2O/O_2 is the most common inhalation sedation in dentistry because of its advantageous properties such as ease of administration, rapid onset, rapid elimination, analgesic effect, and high level of safety [1, 3-6]. There are two administrative techniques of N_2O/O_2 that are usually used for dental treatment, slow titration and rapid induction techniques.

In the slow titration, N_2O/O_2 is usually given in incremental doses until a patient reaches the sedation level. After 100% pre-oxygenation, N_2O is started. Malamed recommends to begin with 20% N_2O concentration. Then, N_2O is titrated in 10% increment every 60 seconds [1]. During operation, operator should frequently ask a patient about his/her signs and symptoms before the level of N_2O/O_2 is increased and until the level of sedation is achieved, in which patient feels relaxed and comfortable. If titration is done properly, patient should not receive N_2O more than necessary.

The percentage of N_2O is not the same for any two individuals [1, 2, 7].

In contrast to the slow titration, the rapid induction is the technique that high dose of N_2O (up to 50%) is administered initially. In emergency room, a mixture of 50% N_2O and 50% O_2, such as Entonox® (Linde Canada Limited, Ontario, Canada) and Kalinox® (Air Liquid Santé International, Paris, France), has been used successfully for rapid sedation in emergency patients. However the use of high concentrations with rapid induction technique may produce an unwanted effect of sedation [2]. Signs and symptoms of oversedation are mouth breathing, nausea and vomiting, sleepiness and dream, uncooperation or uncomfortable feeling [8].

Besides the controversy in the administration techniques, there is also the argument of whether or not to provide 100% O_2 after N_2O is discontinued. Some previous studies believed that diffusion hypoxia can occur because of decreased oxygen saturation (SaO_2) levels in blood caused by the rapid exit of N_2O [4, 6, 9, 10]. Signs and symptoms of diffusion hypoxia are headache, nausea, confusion, lethargy and less than 95% of O_2 desaturation. Application of 100% O_2 during the first 3-5 minutes following discontinuation of N_2O is usually recommended to prevent diffusion hypoxia [4, 6, 9]. On the other hand, there were many studies that reported no signs and symptoms of diffusion hypoxia although no O_2 complementary was given at the end of sedation [4, 11, 12].

In the recovery period, postoperative adverse effects may occur such as subjective symptoms and psychomotor impairment [4, 6, 10]. Subjective symptoms that patient complains are headache, nausea and vomiting [10]. Psychomotor performance at the recovery period is tested to confirm normal psychomotor ability of patient by.many tests such as the drawing test, eye-hand coordinate test, and driving

stimulation test [10]. They are used to evaluate that patient has returned to the baseline and can be safely discharged.

Recovery period after N_2O/O_2 inhalation sedation is very important. The ability to evaluate patient's complete recovery before discharge is required. The difference in administrative techniques may be one factor that affects objective signs, subjective symptoms, psychomotor performance and satisfaction in the recovery period. However, no previous studies have ever investigated all these parameters in the recovery period of different administrations and ending techniques of N_2O/O_2.

The objectives of this prospective stratified randomized design were to compare the objective signs, subjective symptoms, psychomotor performance, recovery time and satisfactions at the recovery period of different administrative and ending techniques of N_2O/O_2 inhalation sedation in healthy volunteers.