CHAPTER I

INTRODUCTION

1.1 Background of Research

The level of awareness on the importance of dental health in addition to general health is increasing. Dental health problems that occur in society are overall due to ignorance and apathy in maintaining the cleanliness of their teeth and oral cavity. Any illness that arises in oral cavity is periodontal diseases which are initiated by inflammatory process in gingiva. The unequivocal role of dental plaque as principal causative agent of gingivitis has been established by Loe and co-workers ever since 1960s (Teles. and Teles, 2008).

Generally, the imbalance of bacterial plaque stimulation towards body’s defence mechanism results in periodontal diseases. Reduction in accumulation of plaque is critical in maintaining gingival health and preventing periodontal diseases which includes mechanical, chemical or a combination of both methods. The concept of chemical plaque control is when chemical compounds like mouthwashes are used for a more complete removal during brushing, flossing and use of auxiliary aids employed in mechanical plaque control (Harris and Garcia-Godoy, 2003). Mouthwashes should have the ability to remove food particles, prevent the accumulation of plaque and act as antibacterial in order to maintain hygienic oral cavity (Manson and Elley, 1995).
According to Food and Drug Administration (FDA), mouthwashes can either be cosmetic, therapeutic or combination of both. Cosmetic mouthwashes functions as mouth fresheners whereas therapeutic mouthwashes act as antiplaque/antigingivitis drug products and anticaries drug products (Toedt, et al., 2005). However, the use of mouthwashes as a chemotherapeutic agent is not well accepted by public of Indonesia due to its relatively expensive price. Therefore, affordable and obtainable ingredients are needed in order to produce economical mouthwashes. For these many years, natural products such as herbs and plant extracts are being used in oral hygiene products (Dumitrescu, 2011). It may include Indian sacred plant.

Holy basil leaves as it is being widely used by the traditional medicinal practitioners for curing different types of diseases including oral diseases. Holy basil (Ocimum tenuiflorum L., formerly known as Ocimum sanctum L.) or traditionally known as Tulsi in Hindi has a long history of medicinal use especially in Ayurveda (Indian traditional system of medicine) and Unani system of holistic health and herbal medicine of the East as it is mentioned in Charaka Samhita (Ayurvedic text) by Charaka (Pattanayak, et al., 2010). The beneficial medicinal aspects can be obtained from different parts of holy basil (leaves, stem, flower, root, seeds and even whole plants) as it has also been suggested to contain properties of anticancer, antidiabetic, antiemetic, anti-fertility, antifungal, anti-inflammatory, antimicrobial, antispasmodic, analgesics, adaptogenic, cardioprotective, diaphoretic and hepatoprotective actions just in order to name a few. The active chemical compound Eugenol (1-hydroxy-2-methoxy-4-
allylbenzene) that presents in holy basil has been found to contribute most of its potential therapeutic values (Prakash and Gupta, 2005). There are many other nutrition values and chemical constituents which are responsible for its therapeutic potentials too. Besides that, the different species of basil leaves which are known as ‘Daun kemangi’ in Indonesia is usually used for eating purpose (Backer, et al., 1963).

Based on the above facts, the author conducted this study to analyse the efficacy of holy basil leaves infusion as a mouthwash for plaque reduction in the oral cavity. Holy basil leaves can be easily obtained and preparation of holy basil leaves infusion is time-saving and very convenient for all age group. In addition to that, holy basil leaves infusion as a mouthwash is the choice of this study because through the survey done in the library of Faculty of Dentistry, UNPAD, there is no study done on holy basil leaves and it is not well known among the Indonesian society for its medicinal benefits including dental health.

1.2 Problem Identification

Based on the background research that has been discussed, this problem can be identified:

‘Is there any reduction on plaque accumulation after gargling with holy basil leaves mouthwash’
1.3 Aim of the Research

The aim of the research is to assess the efficacy of holy basil leaves mouthwash on plaque reduction.

1.4 Benefits of the Research

1) The purpose is to provide evidence to the field of dentistry practitioners that holy basil leaves infusion can be used to reduce dental plaque in order to improve the oral health conditions among the community.

2) The purpose is to benefit public in supplying an alternative method which is cheaper and convenient in reducing dental plaque to prevent inflammation process of gums.

1.5 Conceptual Framework

Dental plaque is an organized mass which adheres to the surfaces of teeth, dental restorations, prosthesis, implants and is also found in the gingival crevice and periodontal pocket. Black in (1898) proposed the term plaque which describes the soft coating on tooth surfaces. Most periodontal diseases including gingivitis and periodontitis which are infectious are initiated as a consequence of dental plaque biofilm formation (Hiremath, 2006; Carranza, et al., 2011).

Dental plaque is specialized bacterial biofilm which consists of diverse microbial community (Fejerskov and Kidd, 2008; Dumitrescu, 2010). One mg of
dental plaque is estimated to contain 250 million bacteria along with a scattering of epithelial cells, leukocytes and macrophages and the number of organisms found supragingivally on a tooth surface may exceed $10^9$ while individual subgingival site can harbour thousand in a healthy crevice to millions ($>10^8$) in deep pocket besides bacteria, mycoplasma, fungi, protozoa and viruses maybe present too (Reddy, 2008; Clerehugh et al., 2009).

Clinical observations have demonstrated a significant association between visible dental plaque with naked eyes and an uninterrupted formation of 1-2 days. Plaque can be easily detected by disclosing solution and scraping the tooth surface with an explorer (Carranza, et al., 2011; Bathla, 2012). Dental plaque can be classified based on its relationship to the gingival margin (supra and sub-gingival). Supragingival plaque develops at or above the gingival margin whereas marginal plaque is found in direct contact with the gingival margin. Subgingival plaque is found below the gingival margin, between the tooth and the gingival sulcular tissue (Lindhe, et al., 2003; Carranza, et al., 2011).

As an effort to preserve oral hygiene and prevent oral disease there is a need for organized plaque removal control (Harris and Christien, 1995). Since mechanical methods have proved to be time-consuming and their effectiveness would depend on skills and techniques of the individuals performing the procedures, there is a necessity for the use chemicals agents as a mouthwash in assisting mechanical tooth cleaning procedure in order to control plaque accumulation and maintain a clean oral cavity (Harris and Garcia-Godoy, 2003; Waghmare, et al., 2011).
There are many kinds of chemical agents used for plaque control such as triclosan, chlorhexidine, octenidine, essential oil mouth rinse and other mouth rinse products include stannous fluoride, cetylpyridinium chloride (quaternary ammonia compound) and sanguinarine which are either available as a toothpaste/dentifrice or in the form of a mouthwash (Eley, 1999; Carranza, et al., 2011). Among these, chlorhexidine gluconate (CHX) is considered as the gold standard in dentistry for the control of dental plaque but it also has a few disadvantages such as brown discolouration of teeth, oral mucosa erosion and bitter taste (Waghmare, et al., 2011). Thus there is a need to provide alternative medicine which is already established within traditional Indian community that been proven safe and inexpensive, one of them is holy basil.

Holy basil is a member of the family Lamiaceae (Labiatae) and is found throughout India and in many parts of the Old World tropics and also in the warmer parts of Australia. It is highly aromatic and different varieties may smell and taste like peppermint, cloves, licorice or lemon. Based on observations made by practitioners and modern scientific research, holy basil has been found to have analgesic, antifungal and antibacterial properties. Besides that, there are many uses and benefits of holy basil leaves related to various human body systems such as cardiovascular-circulatory system, digestive system, endocrine system, immune system, integumentary/skin system, muscular system, nervous system, reproductive system, respiratory system, urinary/excretory system as well as teeth disorder and mouth infections (Maimes, 2004; Kumar, et al., 2012).
The whole plant can be used as a source of remedy. The chemical composition of holy basil leaves is highly complex due to the interactions of many different phytochemicals. The leaves contain essential oil including eugenol, eugenal (also called as eugenic acid), urosolic acid, carvacrol, linalool, limatrol, caryophyllene, methyl carvicol (also called as Estragol) and n-triacontanol while the root’s volatile oil consists of sitosterol, fatty acids, triterpenes A,B and C. Moreover, holy basil also contains romarinic acid (phenylpropanoid), thymol, citral and contains vitamin C and A in addition to minerals like calcium, zinc, iron as well as chlorophyll (Pattanayak, et al., 2010; Singh, et al., 2010). Eugenol (1-hydroxy-2-methoxy-4-allylbenzene), the active chemical compound which present in holy basil leaves has been found to be mostly accountable for its therapeutic benefits (Prakash and Gupta, 2005). Eugenol is identified to be a common ingredient in mouthwashes and toothpastes because it is suggested that it possess antiseptic and antibacterial characteristics (Toedt, et al., 2005; Berger and Sicker, 2009). The other active compound is ursolic acid. It is a triterpenoid compound that presents in many plants with antibacterial, antifungal and anti-inflammatory effects. In a recent research, ursolic acid has been shown to have bactericidal effect on Streptococcus mutans and Streptococcus sobrinus and this result suggests that ursolic acid can be used in the development of oral hygiene products for the prevention of dental caries (Kim, et al., 2011). Hence, the chemical compositions of holy basil prove to be very beneficial in preserving oral hygiene.
1.6 Hypothesis

There are effects on plaque reduction after using holy basil leaves mouthwash.

1.7 Research Methodology

The type of research was clinical trial, double blinded study design and a pre and post-test with a control group. Sample was selected based on purposive sampling method. Data obtained was analysed using t-test.

1.8 Location and Time of Research

The location was at Fakultas Kedokteran Gigi, Universitas Padjadjaran, Jatinangor and time of the research was in February, 2013.