

CHAPTER 1

INTRODUCTION

1.1 Backgrounds

Non-communicable diseases are quickly becoming the most causes of disability in developing countries and as a result, the health policy planners may face tremendous challenges posed by the rapidly changing burden of chronic diseases (Chia-Ching Chen, 2013).

Chronic diseases and most oral diseases share common risk factors. Oral diseases related to dental biofilms, such as dental caries, continue to afflict the majority of the world's population. Tooth loss, periodontal disease, xerostomia, oral cancer and dental caries have a bad effect on the oral health of the population globally. Due to shortage of dental workforce in developing countries, the problem of primary oral health care is quite serious in these areas (Petersen and Kandelman, 2010). People which poor living conditions, low education and cultures support usually have the highest relative risk of the oral disease.

Those practicing poor oral hygiene have a higher probability of suffering from oral diseases. Maintenance of good oral hygiene requires that good and regular home-based oral care be taken (Jeani and Andina, 2019). The most important strategy to prevent periodontal diseases is to perform properly mechanical home biofilm control; however, most of the population do not perform mechanical control properly mostly because they lack motivation and manual dexterity.

Oral microbiota which is one of the most diverse microbial communities in the body, plays a decisive role in terms of the emergence and evolution of gingival pathology. Dental plaque, which is the deposition of microorganisms that are embedded in extracellular matrices, causes dental caries and various periodontal diseases. Microorganisms such as *Streptococcus mutans* and other anaerobes (*fusobacterium* and *actinobacteria*) are the bacteria that cause plaque. These bacteria adhere to the tooth's surface when this process is started (Marsh, Moter

and Devine, 2010). Accumulation of plaque around the perimeter of the teeth and gingiva causes inflammation. A particular move in the amount and assorted variety of the microbial community created on dental and mucosal surfaces, could lead to the chronic inflammation in the oral cavity.

Research in the field of caries prevention has been focusing on ways for reducing totally eradicating cariogenic flora from the oral cavity. Tooth brushing and flossing have a positive effect on caries prevention (Kgozeimeh F, 2014). However, brushing and flossing alone is not effectively to eliminate the *Streptococcus mutans* from pits, fissures and proximal surfaces of the tooth. By combining these methods with chemoprophylactics agents such as CHX, or honey, xylitol, with honey will give us a good effect on caries control.

According to Solmaz and korachi, (2012) Cationic bisbiguanide compound such as Chlorhexidine (CHX) is commonly used as chemotherapeutic agents against oral diseases. As an outcome of its wide spectrum of activity against anaerobic pathogens, gram-positive and negative bacteria by binding to anionic compounds on the bacterial surface in gram-positive and lipopolysaccharide in gram-negative bacteria and disrupting the bacterial integrity. As a result, this leads to leakage and cell death.

However, applying topical antimicrobial agents is a quick and cheap way for the prevention of mechanical periodontal debridement. Besides well known antiseptics agents that can be used in gingivitis or periodontitis prophylaxis and treatment such as CHX or iodine, natural products would be a desirable alternative. Among them, honey bee as a natural product can be used as an effective agent for periodontal treatment and infection control (Patrick R et al., 2014)

Based on Nassar, Li and Gregory (2011) In the history of medical practice honey has provided humans a source of both nutrients and medicines and recently the effect it produced on how to manage certain conditions has renewed remarkable interest in its being a natural therapeutic agent.

The medical properties of honey are well documented. However, the precise treatment of certain condition have caused renewed interest in the homeopathic use of honey. Among the attainable mechanisms are the presence of repressive factors like flavonoids and peroxide, low pH, and high osmolarity because of its sugar concentration.

1.2 Problem

Despite excellent achievements in the oral health of populations globally, issues still stay in many communities all over the world, particularly among under privileged groups in developing countries. Caries and periodontal diseases have been considered the most important global oral health problems (Mathai et al., 2017). At the moment, the distribution and severity of oral diseases vary among different parts of our country. The significant role of socio behavioral and environmental factors in oral disease and health is evidenced in an extensive number of epidemiological surveys. (Dhakal, Humagain and Kafle, 2015) Antibiotics such as penicillin and vancomycin are known to have good antibacterial and anti-caries effect. However, changing in the oral and intestinal flora, and their regular use can result in antibiotic resistance.

As mentioned before, chlorhexidine is the gold standard although, it comes with several drawbacks, changing the color of teeth, irritation, mouth dryness, salivary stones. Thus finding the best alternative natural product is essential. (Mathai et al., 2017)

1.3 Hypothesis

Null hypothesis: Manuka Honey has less anti-bacteria effect compare to CHX 2%

Alternative hypothesis: Manuka honey has more anti-bacteria effect compare to CHX 2%

1.4 Aims/ purposes

There are limited researches have investigated the effect of Manuka honey on *S. mutans*. These studies investigated the impact of honey on many strains of oral bacterium. Honey has been used as a supply of nutrients furthermore as a drugs since history. Recent publications indicating the impact of honey within the management of bound conditions have rekindled interest in honey as a natural therapeutic agent (Mathai et al., 2017). The medicament properties of honey are well documented. However, the particular antimicrobial mechanism of honey continues to be unclear. Among the potential mechanisms is that the presence of repressing factors like flavonoids and peroxide, low pH, and high osmolarity. Honey might have an analogous antibacterial impact on *S. mutans*, that is taken into account the most borne in upon organism of tooth decay.

In this study, we tend to investigate the impact of manuka honey on the expansion, viability, and biofilm formation of *S. mutans*. Also, we can compare it with CHX to see if we can use manuka honey as a natural source for people in the rural area to fight against periodontal disease. (Nassar, Li and Gregory, 2011)

1.5 The benefit

Many agents such as chlorhexidine, fluoride, and xylitol have been prescribed, aiming to prevent dental caries and periodontal diseases. However, it is impossible to ignore the dietary effect of ingestible carbohydrate sources. The effect of honey on *S. mutans* can provide evidence on both the cariogenicity and antibacterial properties of honey. Besides all the advantages, it is useful for the people in the rural area to use it as caries prevention instead of CHX, which is hard to find and have some drawback also. (Beena et al., 2018)