

## STUDY OF ADHESIN FROM *Aggregatibacter actinomycetemcomitans* LOCAL ISOLATE ON ALVEOLAR BONE DESTRUCTION IN AGGRESSIVE PERIODONTITIS DISEASE

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### ABSTRACT

Adhesion is a powerful survival mechanism as well as a virulence mechanism for bacterial pathogens. Bacterial adhesion is a media for bacteria to invade the host. Bacterial adhesion, moreover, is depend on the ligand interaction as a signaling mediator that will influence the invasion process and increase pro and anti-inflammatory due to the influence of the receptors of innate immune response. *Aggregatibacter actinomycetemcomitans* (*A.actinomycetemcomitans*) have many virulence factors that may result in tissue and alveolar bone damage. One of the virulence factors is adhesin that can be isolated from the fimbriae. This research purposed to analyze the ability of adhesin protein from *A.actinomycetemcomitans* that cause the destruction of alveolar bone. Thus, the number of osteoblasts and osteoclasts as well as osteocalcin expression can be used as a marker of damage on the alveolar bone of Wistar rats. The research was conducted through several processes. First, the adhesin of *A.actinomycetemcomitans* with a molecular weight (MW) of 24 kDa is induced into Wistar rats. Next, to determine the number of osteoblasts and osteoclasts performed, hematoxylin eosin staining is conducted. Meanwhile, to determine osteocalcin expression performed, immunohistochemical techniques is used. This research shows the decreasing of the number of osteoblasts and increasing of the number of osteoclasts in the treatment groups induced by adhesin proteins, *A. actinomycetemcomitans* + adhesin protein, and *A.actinomycetemcomitans* compared those in the control group. It also shows the increasing of osteocalcin expressions on the alveolar bone of Wistar rats in the groups induced by adhesin proteins, *A. actinomycetemcomitans* + adhesin protein, and *A. actinomycetemcomitans* than those in the control group. It can be concluded that the adhesin protein of *A. actinomycetemcomitans* plays an important role in the destruction of alveolar bone through the reduction of the number of osteoblasts, the increasing of the number of osteoclasts and osteocalcin expression in aggressive periodontitis.

**Keywords:** *Adhesin, A. actinomycetemcomitans, osteoblast, osteoclast, osteocalcin expression*

### INTRODUCTION

Aggressive periodontitis is a disease found on tissues supporting teeth, and characterized by rapid deterioration in periodontal ligament and alveolar bone. Aggressive periodontitis is usually found in young patients, who are under 30 years old. In the aggressive periodontitis, moreover, the loss of tissue attachment and the recession of gingival can occur four times (4x) faster than in chronic periodontitis (Newman et al., 2006; Velden et al., 2006). Until now, the occurrence of aggressive periodontitis in young age has been a problem that cannot be explained comprehensively in dentistry.

The pathogenesis of periodontitis is actually affected by the interaction of the host and bacterial factors dominated by *Aggregatibacter actinomycetemcomitans* (*A. actinomycetemcomitans*). In other words, the presence of these bacteria in dental plaque can trigger the aggression

of periodontal tissue destruction that may also be exacerbated by genetic and environment factors (Korman 2000). The direct contact between infectious agents and host cells is actually started with the process of adhesion (attachment). The process of adhesion is one of the virulence properties of pathogenic bacteria, which are crucial for the colonization, the invasion and the onset of infectious diseases (Doig et al., 1988). It is because *A. actinomycetemcomitans* have fimbriae which functions as the adhesion and the invasion. The fimbriae, thus, can be considered as the virulence factors in infection process in oral cavity. When periodontitis actively becomes progressive, as a result, the level of MMP-8, in gingival crevicular fluid (GCF) significantly increases, causing damage to periodontal tissues and alveolar bone. This study purposed to analyze the ability of adhesin protein from *A.actinomycetemcomitans* local isolate that cause the destruction of alveolar bone.

### METHODS

#### Culture for *A. actinomycetemcomitans*

The culture for *A. actinomycetemcomitans* should be prepared in Luria Berthani medium as much as 200 mL to be used in each group (20 mice). Thus, it must be pre-

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