

### Research Report

## Beta-defensins-2 expressions in gingival epithelium cells after probiotic *Lactobacillus reuteri* induction

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### ABSTRACT

**Background:** Beta-defensins (BD) are antimicrobial peptides that play a role in defense against pathogens. Beta-defensins (BD) are expressed by a variety of epithelial cells, including gingival epithelium, salivary glands, saliva and salivary duct. BD-1 is expressed constitutively, while BD-2 and BD-3 expressions can be induced by commensal bacteria. Probiotics are commensal bacteria, thus *L. reuteri* as probiotic bacteria may act as "inducer" for BD-2 in epithelial gingiva. *S. mutans* is the main bacteria causing dental caries and sensitive to BD-2. **Purpose:** This study was aimed to prove that the administration of probiotic *L. reuteri* may improve BD-2 expressions in the gingiva epithelium. **Method:** This study was conducted in vivo using twenty-four male *Rattus norvegicus* Wistar strains aged 10-12 weeks and weighed 120-150 g. Those rats were randomly divided into four groups, namely negative control group (not induced with *L. reuteri* or *S. mutans*), positive control group (induced with *S. mutans* for 14 days), treatment group 1 (induced with *L. reuteri* for 14 days and *S. mutans* for 7 days), and treatment group 2 (induced with *L. reuteri* and *S. mutans* for 14 days concurrently). The concentration of *L. reuteri* used was  $4 \times 10^8$  cfu/ml, while the concentration of *S. mutans* was  $1 \times 10^{10}$  cfu/ml. 0.1 ml of each was dropped in the region of the mandibular incisors. BD-2 expression was calculated using immunohistochemical method. The difference of BD-2 expressions in gingival epithelial cells in the respective groups was analyzed by Anova/SPSS. **Results:** There were significant differences in BD-2 expressions in gingival epithelial cells in each group based on the results of Anova test ( $p=0.001$ ). **Conclusion:** The administration of probiotic *L. reuteri* is able to increase BD-2 expressions in gingival epithelial cells.

**Keywords:** beta defensins-2 expression; gingival epithelium; probiotic; *L. reuteri*; *S. mutans*

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### INTRODUCTION

Gingival epithelium is a defense against bacteria in oral cavity, not only physically but also chemically. Defense function of the gingival epithelium is characterized by their unique structure and integrity of the anti-microbial peptide (AMP), such as human beta defensins (hBDs).<sup>1</sup> Defensins are antimicrobial peptides first discovered in mammals. Defensins in humans consist of two sub-families, namely alpha and beta-defensins.

Alpha-defensins are produced by polymorphonuclear leukocytes and panet cells, while beta-defensins are produced by epithelial surface of skin, intestine, trahea, and oral cavity.<sup>2</sup> Defensins have broad activities against bacteria, fungi, and viruses. In the optimal conditions, antimicrobial

activities of defensins work at low concentration of 1-10mg /mL.<sup>3</sup> Human beta-defensins (hBDs) are widely expressed in tissues of the oral cavity, including gingival epithelium, salivary glands, saliva and salivary duct. These peptides are involved in defense against bacteria that colonizes in the oral cavity.

Defensins in the oral cavity have an important role to protect the structure of the teeth from bacteria causing caries. Human beta-defensins have broad antimicrobial activity against oral microorganisms, such as *Streptococcus mutans*, *Porphyromonas gingivalis*, and *Actinobacillus actinomycetemcomitans*.<sup>3</sup> Changes in lifestyle and diet can affect the composition and amount of the normal flora in someone's oral cavity. Several factors causing the