

TITLE: Antimicrobial activity of the peptide Hy-a1 and its analogue Lys-a1 against oral bacteria

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ABSTRACT:

Peptides with antimicrobial activity (PAM) are molecules that are part of the innate immunity of living beings and represent a new perspective of the oral microbiota. Dental caries is the most prevalent chronic infectious disease in the world, affecting up to 80% of the world's population, negatively affecting the health and quality of life of people around the world. Streptococci have been related to the development of caries and are essential in the pathogenesis of this disease. The aim of the present study was to verify the antimicrobial activity of PAMs Hilina a1 (Hy-a1) and its synthetic analogue Lys- [Trp6] hy-a1 (Lys-a1) against Gram-positive oral streptococci. *Streptococcus mutans* strains ATCC 25175, *S. sobrinus* ATCC 6715, *S. sanguinis* ATCC 10556, *S. oralis* ATCC 10557, *S. parasanguinis* ATCC 903 and *S. salivarius* ATCC 7023 were used. Inhibitory and Minimum Bactericidal Concentrations (MIC/MBC) were determined by microdilution in 96-well plates of Hy-a1 and Lys-a1, comparing with Chlorhexidine Digluconate (CHX), considered the gold standard for clinical purposes. Our results showed that all microorganisms tested showed sensitivity to antimicrobial peptides. Hy-a1 presented better antimicrobial activity (3.90-15.60 µg/mL) when compared to the synthetic analogue, Lys-a1 (3.90-31.25 µg/mL). With emphasis on *S. parasanguinis*, which showed greater sensitivity to the tested peptides, with a bacteriostatic action of 3.90 µg/mL. *S. mutans* showed more resilience in the presence of antimicrobial agents, the bactericidal effect was obtained only at concentrations above 15.6 µg/mL for Hy and 31.25 µg/mL for Lys-a1. The difference in activity between the two peptides may be related to the total net charge of the molecule, since a basic amino acid, lys, was inserted into the N-terminal region of the native peptide. These charge changes may directly interfere in the interactions between PAM and the bacterial surface to trigger the cytolytic effect. In conclusion, the results indicate that PAM, Hy-a1 its synthetic analogue, Lys-a1, have relevant antimicrobial activity against oral streptococci and may be a biotechnological alternative in the control of these microorganisms.

Keywords: Oral streptococci. Peptide. Antimicrobial activity. Caries.