

Slime production and adhesion properties among lactobacilli isolated from dental caries

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Abstract:

Bacterial exopolysaccharides are attached to the cell wall (capsules) or secreted into the extracellular environment (slime) and they play an important role in adhesion properties of bacteria. The capacity to form biofilm is considered as a virulence factor. In our study a collection of 67 *Lactobacillus* spp. strains isolated from early childhood caries was tested for slime production and adhesion to solid surfaces. Analysed group consisted of *Lactobacillus fermentum* (20 strains), *Lactobacillus rhamnosus* (15), *Lactobacillus casei/paracasei* (14), *Lactobacillus gasseri* (7), *Lactobacillus salivarius* (7), and *Lactobacillus plantarum* (4). Slime-forming ability was tested on modified Congo red agar plates enabling direct analysis of the colonies and the selective recognition of slime forming strains. Bacterial adhesion onto the inner surface of the test tubes (borosilicate glass and polystyrene tube) was tested in brain heart infusion broth. Congo red agar plates revealed 36 obvious slime producing strains among the analysed lactobacilli and another 23 strains with presumable biofilm formation. Adhesion onto the surface of tubes was read clearly in polystyrene tubes. In contrast, the adhesion in the glass tubes was difficult to read. The results obtained by these two methods were greatly different. Only 13 *Lactobacillus* strains formed the biofilm layer on the wall of the polystyrene tubes, while 37 strains showed an adherent biofilm layer on internal walls of the glass tubes. All strains positive in polystyrene tubes showed slime production on Congo red agar plates; the results of biofilm formation in glass tubes were slightly distinct from the Congo red agar plates testing. The biofilm producing strains were found among the majority of *Lactobacillus casei/paracasei*, *Lactobacillus salivarius*, *Lactobacillus plantarum*, *Lactobacillus rhamnosus* and *Lactobacillus fermentum* isolates. In contrast, none strain of *Lactobacillus gasseri* formed slime. In conclusion, the biofilm formation was detected in majority of lactobacilli isolated from the dental caries. However, low correlation was revealed between the presented phenotypic methods for testing of slime production and adhesion properties of lactobacilli. Supported by the Czech Science Foundation (310/09/0657) and the Ministry of Education, Youth and Sports of the Czech Republic (1M0528).

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