

Title: EVALUATION OF BIOFILM FORMATION BY PATHOGENIC BACTERIA IN STAINLESS STEEL SURFACES

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Abstract

Food processing industries have conditions that favor the development of pathogens such as, moisture, nutrient availability and microorganisms inoculum from raw materials. Microorganisms can be found dispersed in these environments (planktonic) or in the form of biofilms on contact surfaces. Bacterial adhesion and subsequent biofilm formation on surfaces of equipment and utensils is a potential source of contamination that can lead to transmission of foodborne diseases, degrading products and resulting in economic loss. Thus, the aim of this study was to evaluate biofilm-forming ability of food poisoning bacteria in stainless steel surface AISI type 304. The following bacteria were used: *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 27853), *Staphylococcus aureus* (ATCC 25923) and *Salmonella enterica* serovar Typhimurium (ATCC 14028). Plaque formation assays were performed with 1 cm² stainless steel squares (AISI type 304) in 12 wells polystyrene microplates. The plates were incubated in the shaker with agitation of 60 rpm at 37°C for 24 hours. Quantification of the adhered cells was performed by spread plate technique. Assays were performed in duplicate on three different occasions. After the incubation period, it was found that *S. Typhimurium* (6.77×10^8 CFU/cm²) and *P. aeruginosa* (4.05×10^8 CFU/cm²) had more culturable cells adhered on the stainless steel surface, when compared to *S. aureus* (3.03×10^6 CFU/cm²) and *E. coli* (3.77×10^5 CFU/cm²), however all showed biofilm formation. The biofilm formation by *P. aeruginosa* was statistically different ($P < 0.05$) than *S. aureus* and *E. Coli*. The higher biofilm formation capacity by *P. aeruginosa* and *S. Typhimurium* is related to its increased production of extracellular polymeric substances (EPS), hydrophobicity and cellular appendages. The results show that the bacteria under study have the ability to form biofilms on food industries surfaces, which can lead to several harmful effects, including the transmission of foodborne diseases. Therefore, cleaning and disinfecting procedures of equipment, utensils and surfaces must be regular in those environments in order to reduce contamination and biofilm formation.

Keywords: Bacterial adhesion, stainless steel AISI type 304, foodborne diseases.