Title: QUANTITATIVE ANALYSIS OF BIOFILM FORMATION IN MULTIDRUG RESISTANT Acinetobacter baumannii AND Klebsiella pneumoniae STRAINS: GENOTYPIC CHARACTERISTICS AND CLONAL PROFILES


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Abstract:
This study evaluated the biofilm formation ability of clinical and environmental A. baumannii and K. pneumoniae strains, isolated from various sources and presenting different molecular characteristics, resistance profiles and PFGE patterns. Fifty-three isolates, 23 A. baumannii and 30 K. pneumoniae were recovered from 2009 to 2014 in a Brazilian university hospital. In A. baumannii the following genes were evaluated blaOXA-51, blaOXA-23, blaOXA-24, blaOXA-58, blaOXA-143, ISAb1 (Insertion Sequence), ISAb1blaOXA-23-ike, ISAb1blaOXA-51-ike, carO (29kDa) and OMP 33–36 kDa; and in K. pneumoniae the resistance genes blaKPC, blaTEM, blaSHV, blaCTX-M, blaampC and the virulence genes khe, fimH, iucC, mrkD, rmp, wabG, ecpA, fimA were evaluated.

Investigation of biofilm formation was performed for ten strains of each species assessed by an initial adhesion assay, biofilm cell concentration and biofilm biomass, evaluated by quantitative assays. All strains of A. baumannii were able to attach to polystyrene plates, although two strains adhered to a lesser degree than the control (P<0.001). K. pneumoniae strains showed opposite behaviour, where only three strains adhered significantly when compared to the control (P<0.001). Regarding the amount of cells in the biofilm, in general, both A. baumannii and K. pneumoniae strains showed a large amount of cells compared with the control. Quantitative evaluation revealed that in five A. baumannii and four K. pneumoniae isolates the biomass production could be characterised as moderate. None of the isolates were strong biofilm producers and only one strain of K. pneumoniae was a non-biofilm producer. Although 85% of the strains evaluated had been characterised as multidrug resistant, there was no significant association between this phenotype and the production of biofilm, and there was no association between the pulsotype and the ability to form biofilms. Our results demonstrate: (1) biofilm formation is a heterogeneous property amongst A. baumannii and K. pneumoniae clinical strains and it was not associated with certain clonal types; (2) No relationship between multidrug resistance and biofilm production was observed; (3) more virulent K. pneumoniae strains tended to present higher production of biofilm.

Keywords: Acinetobacter baumannii, Klebsiella pneumoniae, biofilm, resistance.

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