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Phenotype and genetic determination of resistance to common disinfectants among biofilm-producing and non-producing *Pseudomonas aeruginosa* strains from clinical specimens in Iran

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Abstract

Background: *Pseudomonas aeruginosa* is a common pathogen in Hospitalized patients, and its various resistance mechanisms contribute to patient morbidity and mortality. The main aims of the present study were to assess the susceptibility of biofilm-producing and non-producing *P. aeruginosa* isolates to the five commonly used Hospital disinfectants, to evaluate the synergistic effect of selected disinfectants and Ethylene-diamine-tetra acetic acid (EDTA), and the effect of exposure to sub-inhibitory concentrations of Sodium hypochlorite on antimicrobial susceptibility test.

Results: The results showed that sodium hypochlorite 5% and Ethanol 70% were the most and least effective disinfectants against *P. aeruginosa*, respectively. The addition of EDTA significantly increased the effectiveness of the selected disinfectants. The changes in the antibiotic-resistance profiles after exposure to sub-inhibitory concentrations of disinfectants were observed for different classes of antibiotics (Carbapenems, Aminoglycosides, Cephalosporins, Fluoroquinolones). As well as near the all isolates harbored efflux pump genes and 117 (97.5%) of isolates produced biofilm.

Conclusion: In the current study, the mixture of disinfectant and EDTA were the most suitable selection to disinfect Hospital surfaces and instruments. Also, it was clear that exposure to sub-inhibitory concentrations of Sodium hypochlorite results in resistance to some antibiotics in *P. aeruginosa* species. Strong and intermediate biofilm formers belonged to MDR/XDR strains. Future studies should include more complex microbial communities residing in the Hospitals, and more disinfectants use in Hospitals.

Keywords: Nosocomial infection, Disinfectant-resistance, Biofilm, Hospital disinfectants, *Pseudomonas aeruginosa*, Clinical isolates

Background

P. aeruginosa is a gram-negative bacilli and is known as human opportunistic pathogen, especially for high-risk patients, including burn wounds, immunocompromised patients, and cystic fibrosis [1, 2]. It is a member of the ESKAPE (*Enterococcus faecium*, *Staphylococcus aureus*,

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