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ANTIBIOTIC RESISTANCE PATTERN OF BIOFILM PRODUCING BACTERIA ISOLATED FROM WATER PLUMBING SYSTEMS

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Microbial biofilm is a three-dimensional complex community of microbial cells enclosed in a self-produced matrix that protects the microbes from the harsh environment, including antibiotics. As a result, biofilm bacteria could exhibit resistance to antibiotic treatments, leading to persistent infections that contribute significantly to morbidity and mortality rates. The objective of this study was to assess the antibiotic resistance of biofilm bacteria in water plumbing systems, i.e. distribution line (drinking water and scrapings) and drain line (wastewater and scrapings). Bacterial isolates were confirmed for biofilm production using the Tissue Culture Plate method, Congo red agar method and Tube method. The biofilm bacteria were classified into four groups i.e. group 1: coliform group bacteria excluding *Escherichia coli*; group 2: *Escherichia coli*; group 3: *Pseudomonas aeruginosa* and group 4: *Staphylococcus aureus* based on morphological and biochemical tests. These bacteria were tested for antibiotic susceptibility using the Kirby-Bauer disc diffusion method, with the following recommended antibiotics; Amoxicillin/Clavulanic acid, Ceftriaxone, Ciprofloxacin, Gentamicin, Tetracycline, and Cotrimoxazole. The results revealed that all the bacteria screened in this study were resistant to Amoxicillin/Clavulanic acid. Bacteria from groups 1 and 3 primarily exhibited resistance to Tetracycline and Cotrimoxazole, respectively. Meanwhile, bacteria from group 2 and group 4 showed resistance to both Gentamicin and Tetracycline. Additionally, some bacteria from all four groups demonstrated resistance to both Ciprofloxacin and Ceftriaxone. The antibiotic sensitivity patterns varied among each group based on the location of isolation (distribution line and drain line). However, no consistent correlation was observed within each group, likely due to their isolation from different areas of the water plumbing system, variations in nutrition levels, differences in biofilm formation efficiencies, and the presence of different strains of the same bacteria. These findings highlight the challenge posed by biofilm formation in water plumbing systems and the need for strategies to combat infections associated with biofilms.

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