VIRULENCE FEATURES OF OPPORTUNISTIC PATHOGEN STENOTROPHOMONAS MALTOPHILIA: BIOFILM FORMATION, CAPSULE PRODUCTION, AND ANTIBIOTIC RESISTANCE

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Antibiotic resistance is one of the most urgent global health crises today, causing over a million deaths annually [1]. Multidrug-resistant pathogens can withstand multiple treatment options, increasing patient mortality, prolonging recovery, and burdening health care facilities [1]. One such multidrug-resistant pathogen is *Stenotrophomonas maltophilia*, an opportunistic bacterium that causes infections with mortality rates as high as 69% [2]. This pathogen can form biofilm and produce polysaccharide capsule [3], both of which can contribute to its persistence in the clinical environment, evasion of immune responses, and resistance to antibiotic treatment [2; 4]. Despite the clinical significance of *S. maltophilia*, there remains a lack of understanding regarding its resistance mechanisms and virulence factors.

This study aimed to assess biofilm formation and the distribution of biofilm-associated genes in 102 clinical isolates of *S. maltophilia* obtained from patients at Vilnius University Hospital Santaros Klinikos, as well as to examine the impact of the polysaccharide capsule on antibiotic resistance. Biofilm formation at 37 °C was measured using crystal violet staining [5]. The following biofilm-associated genes in 71 isolates were selected for PCR analysis: *pilU*, *rmlA*, *smf1*, *fliC*, *ax21*, *spgM*, *fliA*, and *rpfF*. The impact of the polysaccharide capsule on antibiotic resistance was evaluated by comparing the minimal inhibitory concentrations (MICs) of 13 antibiotics (kanamycin, streptomycin, gentamicin, chloramphenicol, tetracycline, colistin, ampicillin, ceftazidime, cefazolin, imipenem, meropenem, and a combination of sulfamethoxazole/trimethoprim) between the wild-type isolate and its capsule-deficient mutant (*Δwzc*).

Out of the 102 *S. maltophilia* isolates analyzed, 98 % produced biofilms, indicating that biofilm formation is an important trait for *S. maltophilia* in clinical settings. The analyzed genes in 71 isolates were detected at high frequency, and no clear correlation was found between biofilm formation levels and the presence of biofilm-associated genes. This suggests that either other unexamined genes or gene regulation mechanisms might influence biofilm formation in *S. maltophilia*. MIC comparisons between the wild-type strain and its capsule-deficient mutant revealed that the loss of the polysaccharide capsule significantly increased the bacterial susceptibility to β-lactams (ceftazidime, imipenem, meropenem). Therefore, the polysaccharide capsule could be a target for next-generation drugs to improve the efficacy of antibiotic therapy.

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