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Inhibition of biofilm formation in clinical isolates of *Staphylococcus aureus* by Lactobacillus spp. from soured milk

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ABSTRACT

Objectives: *Staphylococcus aureus* as a biofilm-forming pathogen has the ability to resist therapeutic treatments evident in prolonged diseases burden. Thus, the aim of this study is to determine the anti-biofilm potential of lactic acid bacteria on biofilm forming *Staphylococcus aureus* from clinical samples.

Methodology and Results: Seventeen (17) swab samples were collected from hospitalized patients and screened for the presence of biofilm forming *Staphylococcus aureus*. The percentages of *Staphylococcus aureus* obtained are 11.76%, 35.29% and 52.94% from body fluids, infected wounds and urinary crevices/implants respectively. The biofilm formation assay conducted showed that all the *Staphylococcus aureus* isolates were biofilm formers but with varying degrees of adherence, that is, weak and moderately adherent biofilm formers. The anti-biofilm effect of probiotic Lactic Acid Bacteria (LAB) isolated from soured milk on the isolates had highest percentage of moderate biofilm (60%) in urinary crevices isolates and weak biofilm formation (50%) from both body fluid and urinary crevices isolates. Comparative analysis of *Staphylococcus aureus* biofilm inhibition between probiotic from soured milk and pathogenic LAB showed that while the probiotic LAB significantly inhibited biofilm formation for all the *Staphylococcus aureus* isolates; S1-S17 ($p \leq 0.05$), the pathogenic LAB significantly inhibited biofilm formation in only four isolates; S10, S14, S16 and S17 ($p \leq 0.05$).

Conclusions and application of findings: This study demonstrates the antibiofilm ability of probiotic LAB as better inhibitors than the pathogenic LAB species against a major virulence factor (biofilm formation) in *Staphylococcus aureus*. The antibiofilm potentials of LAB isolates can serve as alternatives to chemically synthesized agents in reducing or inhibiting pathogenic biofilm formations in treatment and management of infections in clinical settings.

Keywords: Biofilm; Lactic acid bacteria; Pathogenic; Probiotics; *Staphylococcus aureus*