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Effect of probiotic yeast *Saccharomyces cerevisiae* on hemolytic activity and expression of alpha-hemolysin in *Staphylococcus aureus*

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Background: Alpha-hemolysin is one of the *S. aureus* exotoxins that plays an important role in the pathogenicity of this bacterium. Alpha-hemolysin, by expanding the pores in the lipid bilayer membrane, causes the osmotic lysis and cell disruption. Furthermore, this toxin can cause tissue damage by changing cellular signaling pathways and inflammatory responses. This study addressed the effect of probiotic yeast *S. cerevisiae* on hemolytic activity and expression of alpha-hemolysin in *S. aureus*.

Methods: The 24-h broth culture of indigenous *S.cerevisiae* yeast was centrifuged. The supernatant was extracted using ethyl acetate. Ethyl acetate was then removed by rotary evaporator and dried extract was obtained. After determining the MIC of the extract for two standard strains of *S. aureus* ATCC 29213 (MSSA) and ATCC 33591 (MRSA), the effect of1/2 MIC concentration was evaluatedon hemolytic activity (by measuring the hemoglobin released from rabbit's RBC) and alpha-hemolysin gene expression (using Real-Time PCR).

Results:MIC of supernatant extract was 4096 µg/ml for both strains. Concentration of 2048 µg/ml of supernatant extract wassignificantly reduced the hemolytic activity of both strains *(P <0.001)*. This extract reduced thealpha-hemolysin gene expression 40 fold in the *S. aureus* ATCC 29213 strain and 71 fold in ATCC 33591 strain.

Conclusion: In this study, the reduced production of alpha-hemolysin in methicillin-susceptible and resistant *S. aureu*s was observed by *S. cerevisiae* supernatant. Further studies could be done to treat the infections caused by *S. aureus* using probiotic yeasts.

Keywords: Alpha-hemolysin,Probiotic,*Saccharomyces cerevisiae*, *Staphylococcus aureus*