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Abstract

Are Low Lactose Concentrations a Risk Factor for *Staphylococcus aureus*-Associated Mastitis? †

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Abstract: *Staphylococcus aureus* is a bacterium found in the milk of up to 38% of healthy lactating mothers; however, *S. aureus* is isolated with increased frequency from colostrum and mastitis milk. Both of these milk types have lower lactose concentrations compared to mature milk from healthy lactating mothers, which may indicate that lactose has a role in determining whether *S. aureus* can survive in human milk. The aim of this study was (1) to investigate whether the presence of *S. aureus* in human milk is associated with the milk's lactose concentration, and (2) to determine whether different lactose concentrations can affect the ability of *S. aureus* isolates to grow in vitro. Human milk samples were collected at 10 weeks postpartum from mothers participating in the Drakenstein Child Health Study (Cape Town, South Africa) and underwent NMR spectroscopy to determine their metabolome. A subset of these samples (n = 117) was cultured to isolate *S. aureus*. Milk samples with lactose concentrations of less than 166 mM were more likely to have *S. aureus* present, compared to samples with lactose concentrations of over 166 mM ($p < 0.001$). In vitro, the growth of *S. aureus* was negatively correlated with the lactose concentration of axenic culture. Lactose concentrations associated with human milk appear to have an inhibitory effect on the growth of *S. aureus* human milk isolates. Therefore, low-lactose human milk could potentially be a risk factor for increased *S. aureus* growth and the development of *S. aureus*-associated mastitis.

Keywords: *Staphylococcus aureus*; human milk; lactose; mastitis; culture

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