

Effect of essential oils on the planktonic of *S.aureus* and *E.coli* cells

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The essential oils of aromatic plants and their components have a wide range of applications in ethno-medicine, preservation, food flavoring and fragrances and in the perfume industries. Some essential oils derived from plants have revealed promising antimicrobial activity against a wide range of bacteria, including antibiotic resistant species.

The aim of this study was to examine the antimicrobial effect of essential oils of *Cinnamomum zeylanicum* and *Cymbopogon martini* against planktonic *Staphylococcus aureus* and *Escherichia coli* growth.

The antimicrobial activity of the essential oils was checked by bacterial growth, at 37 °C and 120 rpm, in the presence of increasing concentrations of each essential oil for 24 h. Essential oils were dissolved in DMSO (2.0 %) and saline water (0.85 %) with tween 80 (0.5 %) in order to obtain final concentrations of 0.06 %, 0.09 % and 0.12%, for *E. coli*, and 0.09 %, 0, 12 %, 0.36 % and 0.48 %, for *S. aureus*. Bacterial planktonic growth over time was followed by the quantification of the number of viable through cultivation of aliquots in TSA.

Data showed that *E. coli* was more sensitive to the action of both essential oils, since complete planktonic growth inhibition was attained with a concentration of 0.09 % of the essential oil of *C. zeylanicum* oil and 0.06 % of the essential oil of *C. Martini*. Conversely, *S. aureus* was less sensitive to the antimicrobial action of the essential oils. *C. zeylanicum* essential oil inhibited *S. aureus* growth only at concentrations of 0.36 % and 0.48 %, after 4 and 2 hours of growth. However, unexpectedly after 24 hours those *S. aureus* cells recovered gradually their planktonic growth.

The data pointed out that it is crucial to check the bacterial behavior in the presence of antimicrobial products in different concentrations and over time due to the possible development of bacterial tolerance towards the mechanisms of action of those products. In fact, antimicrobials may have a positive effect in the early hours of application, as demonstrated by some results of this experiment. However, for longer times, the inhibitory effect of antimicrobials can be reverted by bacteria making ineffective their use as disinfectants in food industries. Additionally, the continuous exposure of bacteria to antimicrobials can influence the process of microbial resistance de development and increase. These preliminary results demonstrated the possibility of using essential oils of *C. zeylanicum* and *C. martini* against two bacteria that are responsible for foodborne illnesses at low concentrations but only for slightly prolonged periods of exposure.

Keywords: natural antimicrobial agents, planktonic growth, S.aureus, E.coli, essential oils