

RESEARCH NOTE

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Synergistic effects of silybin and curcumin on virulence and carbapenemase genes expression in multidrug resistant *Klebsiella oxytoca*



Abstract

Objective

Silybin and curcumin have potential antimicrobial effects. This study aimed to evaluate the synergistic antimicrobial effects of silybin and curcumin on virulence and carbapenemase genes expression among multidrug-resistant (MDR) *Klebsiella oxytoca*.

Results

A total of 70 MDR *K. oxytoca* (carrying *bla*_{IMP} and *bla*_{OXA-48-like} genes) were included. The antibiotic susceptibility and biofilm production of isolates were determined. The silybin and curcumin at concentrations 10–500 mg/mL alone and in combination were exposed to bacterial isolates in Mueller Hinton broth medium for 24 h. The expression of *bla*_{IMP}, *bla*_{OXA-48-like}, *mrkA*, *pilQ*, *matB* and *fimA* genes was evaluated using quantitative real-time polymerase chain reaction (qRT-PCR).

The mean minimum inhibitory concentration (MIC) of curcumin and silybin were 250 mg/mL and 500 mg/mL, respectively. The anti-virulent effect of 100 mg/mL of silybin and curcumin was shown by significant reduction in the expression of *fimA* (2.1-fold, $P < 0.0001$) and *mrkA* (2.1 fold, $P < 0.0001$) genes. Moreover, these compounds significantly decreased the expression of *bla*_{IMP1} (3.2-fold, $P < 0.0001$) gene. Notably, there was no significant effect on *pilQ*, *matB* and *bla*_{OXA-48-like} genes. The results showed that silybin and curcumin can be candidate as natural way for control the MDR virulent strains of *K. oxytoca*.