TITLE: Antimicrobial and anti-biofilm activity of quercetin nanoparticles in *Escherichia coli* and *Staphylococcus aureus* multi-resistant

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Infectious diseases related to multidrug-resistant microorganisms and biofilm producers highlighted the increasingly need to identify new compounds with antimicrobial activity. In this context, the present study aimed to evaluate the antimicrobial and anti-biofilm activity of the nanoencapsulated quercetin nutraceutical against multidrug-resistant strains of *Escherichia coli* and *Staphylococcus aureus.* Five multidrug-resistant isolates of *E. coli* and five multidrug-resistant isolates of *S. aureus* were evaluated. In addition, it was also evaluated *E. coli* ATCC 259222 and *S. aureus* ATCC 29213. The plate count method was performed to determine the inhibitory capacity of the nanoparticle. The nanoparticles were added at a concentration of 50mg / mL, 25mg / mL, 12.5mg / mL, 6.25mg / mL and 3.125mg / mL in 150uL of BHI containing 1% of the bacterial cultures (0.5 MCFarland scale). The plate was incubated at 37 ° C for 24 hours. Then, it was done the serial decimal dilution and plated on BHI agar. Incubation was done at 37 ° C for 24 hours, following by colony counting. The violet crystal technique was used to evaluate the anti-biofilm action. BHI broth with and without nutraceutical (25mg/mL) was inoculated with 1% of bacterial cultures (0.5 MCFarland scale) and incubated at 37 ° C for 24 h. After incubation, the wells were carefully rinsed with saline and stained with 200 µl of 0.1% crystal violet solution for 10 min. The dye was washed with saline and then resuspended with 100ul of 95% ethanol. The intensity was measured at OD450nm using a microplate reader to quantify biofilm biomass. The addition of quercetin nanoparticles in the concentration of 50mg/mL and 25mg/mL were able to completely inhibit the growth of the evaluated microorganisms (except for multi-resistant *E. coli* 95). At concentrations of 12.5 mg/mL and 6.25 mg/mL, significant reductions of about 6 CFU/mL logs of *E. coli* and *S. aureus* isolates were observed ($p < 0.05$). The nanoparticle containing quercetin was able to significantly reduce the biofilm formation *by E. coli* ATCC 259222, as well as, four multidrug-resistant *E. coli* isolates and four multidrug-resistant *S. aureus* isolates ($p < 0.05$).Quercetin nanoparticles are an important therapeutic strategy in the face of infections by biofilm-forming and multidrug-resistant microorganisms, guaranteeing themselves as possible effective alternative for fantimicrobial therapy.

KEYWORDS: Nutraceuticals. Biotechnology. Infections.

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