

## Article

# Synthesis and evaluation of functionalized chitosan nanoparticles as antimicrobial agents

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## Abstract

The aim of this study is to evaluate the bacteriostatic effect of functionalized chitosan nanoparticles with antioxidants from tropical fruit extracts. In their synthesis and characterization, variables are treated in order to obtain concentrations and other parameters, which show bacteriostatic effect on some species of pathogenic gram-negative ATCC bacterias *E.coli*, and *P. aeruginosa*, and gram-positives *S. Aureus*, and *E. faecalis*. The hypothesis of this study is that functionalized nanoparticles synthesized according to the ion gelation method using tripolyphosphate as cross-linking agent with modifying agents from tropical fruit extracts, rambutan (*Nephelium lappaceum*) and blackberry (*Rubus glaucus*), containing antioxidants; gallic acid, giving chitosan nanoparticles the ability to inhibit bacterial growth. This research evaluated the polyphenol content and antimicrobial activity in conjunction with the nanoparticles against the pathogens mentioned above. Laboratory assays show concentrations between 90 and 200 mg of gallic acid/100g and antimicrobial activity in the gram-positive *S. aureus* and *E. faecalis*, and in the gram-negative *P. aeruginosa* and *E. coli*; determined by the disc diffusion method showing an inhibition diameter between 9 mm and 18 mm. These results show the potential of these nanoproducts as potential antimicrobial agents for use in the pharmaceutical industry.

**Keywords:** Nanoparticle, chitosan, bacteriostatic, natural polyphenols, antimicrobial agents.