**Title:** Novel approach for controlling resistant Listeria monocytogenes to antimicrobials using different disinfectants types loaded on silver nanoparticles (AgNPs)

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**Abstract**:

A combined use of silver nanoparticles (AgNPs) with different types of disinfectants as antimicrobial might be useful in mitigating the problem of development of bacterial resistance with a strong enhancement of the biocidal effect of disinfectants. To evaluate the biocidal activity of silver nanoparticles and its loaded forms, five commercial disinfectants (quaternary ammonium compounds (benzalkonium chloride (BC) and TH4+), Virkon®S, sodium hypochlorite, and hydrogen peroxide (H2O2)) were used against *Listeria monocytogenes (L. monocytogenes*) isolates at different concentrations and exposure times to reveal intra-species variability and the percentage of resistance to antimicrobial agents used. Therefore, a total of 260 specimens from animal and human stool as well as environmental samples from dairy cattle farms were cultured for isolation of L. monocytogenes. Thereafter, bacterial isolates were identified using PCR. Silver nanoparticle was synthesized using chemical reduction. Both silver nanoparticles and its loaded forms were characterized by transmission electron microscopy (TEM). The sensitivity test of 60 strains of L. monocytogenes bacteria to AgNPs and its loaded forms was evaluated using broth macrodilution method. Virkon®S/AgNPs 2.0% exhibited the highest bactericidal effect (100%) against L. monocytogenesstrains followed by H2O2/AgNPs 5.0% and TH4+/ AgNPs 1.0% (90% each). Furthermore, the percentage of resistance of L. monocytogenes was 0.0% to both H2O2/AgNPs 5.0% and Virkon®S/AgNPs 2.0%. In conclusion, monitoring the main source of contamination with Listeria monocytogenes in dairy cattle farms is an essential factor to achieve an efficient control. Moreover, the use of the disinfectants, Virkon®S 2.0%, H2O2 5.0%, and TH4+1.0%, loaded on silver nanoparticles composite had the strong bactericidal effect against *L. monocytogenes*.

**Keywords**:*Listeria monocytogenes*. Antimicrobial resistance.AgNPs.Disinfectants. Disinfectants/silver nanoparticles composite

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