



ANTIBACTERIAL POTENTIAL OF GREEN-SYNTHEZED SILVER NANOPARTICLES AGAINST ANTIBIOTIC-RESISTANT BACTERIA

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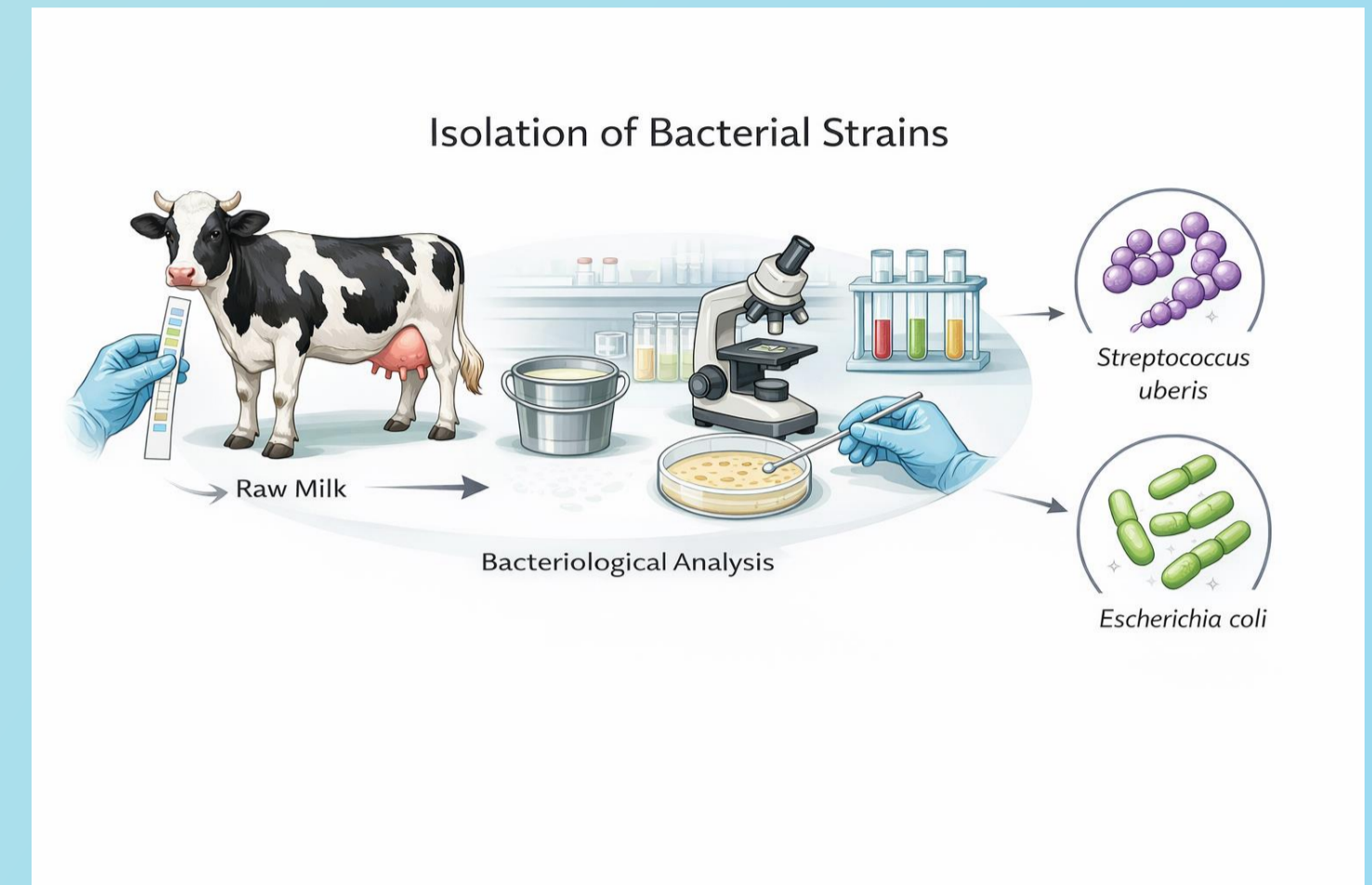
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ABSTRACT: The increasing prevalence of antibiotic-resistant bacterial strains highlights the need for alternative antimicrobial strategies. Biologically synthesized nanoparticles provide a promising approach due to their unique mechanisms of action. Plant extracts in green synthesis influence nanoparticle bioactivity and interaction with bacteria.

This study evaluated the antibacterial activity of silver nanoparticles synthesized using rosemary (*Rosmarinus officinalis*) extract. Nanoparticles were prepared with rosemary extract as both reducing and stabilizing agent. Antibacterial activity was assessed using the disk diffusion method, with gentamicin as positive control.

Rosemary-mediated silver nanoparticles inhibited the tested strains, with inhibition zones of 10 mm for *Escherichia coli* and 6 mm for *Staphylococcus aureus*. Gentamicin showed no effect against these antibiotic-resistant strains.

These results indicate that green-synthesized silver nanoparticles could serve as a potential alternative or adjunct to conventional antibiotics. Further studies are needed to optimize concentrations and clarify mechanisms of action.



MATERIALS AND METHODS

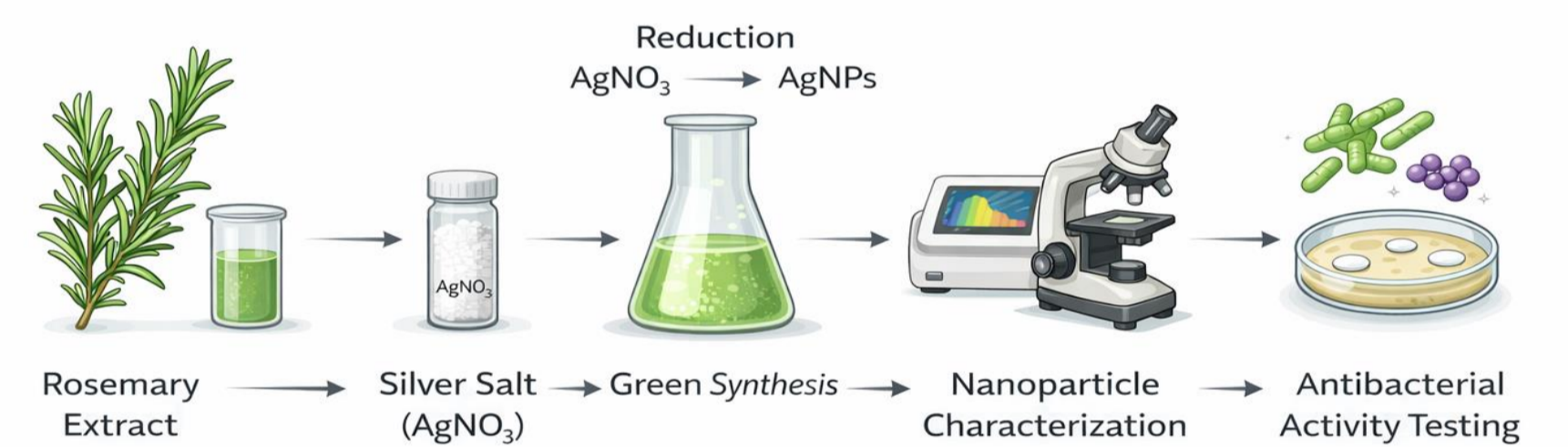
Nanoparticle synthesis: Silver nanoparticles were synthesized using silver nitrate (AgNO_3) as precursor and rosemary (*Rosmarinus officinalis*) extract as reducing and stabilizing agent.

Bacterial strains: *Escherichia coli* and *Staphylococcus aureus*.

Antibacterial assay: Disk diffusion method.

Controls: Gentamicin (positive), distilled water (negative).

Measurements: Inhibition zones measured in mm.



RESULTS AND DISCUSSION

Rosemary-mediated silver nanoparticles inhibited growth of tested bacteria.

E. coli: 10 mm

S. aureus: 6 mm

Gentamicin ineffective against these resistant strains.

Mechanisms: Disruption of membranes, ROS generation, interference with DNA/protein synthesis.

Plant compounds (polyphenols, flavonoids) may enhance nanoparticle-bacteria interaction.

Gram-negative vs. Gram-positive differences may explain varying susceptibility.

CONCLUSION:

Green-synthesized silver nanoparticles show significant antibacterial activity against antibiotic-resistant bacteria.

They represent a promising alternative or complementary approach to conventional antibiotics.

Future work: Optimize concentration, safety, and detailed mechanism elucidation.

Acknowledgements

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