A Novel Eco-Friendly Approach for Eliminating E. coli Using Natural Materials Without Chemicals to Promote Environmental and Human Health

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Escherichia coli (E. coli) is one of the primary bacterial causes of urinary tract infections (UTIs), accounting for 75–95% of cases. Conventional antibiotics are commonly used for treatment; however, they may lead to side effects and contribute to increased bacterial resistance, posing a global health challenge. This study aims to evaluate the effectiveness of natural extracts such as garlic, apple cider vinegar, turmeric, and cinnamon in inhibiting the growth of E. coli as a safe and environmentally friendly alternative. The active compounds were extracted from these substances, and their effects were analyzed using the disk diffusion test. The results showed that garlic and apple cider vinegar were the most effective, with inhibition zone diameters averaging 10 mm and 14 mm, respectively, indicating strong antibacterial activity. These findings suggest the potential for developing natural alternatives to conventional antibiotics, which could help mitigate bacterial resistance to drugs. Challenges encountered included the need for further testing on bacterial strains and ensuring the medical safety of these compounds. In the future, these extracts could be developed into therapeutic supplements or incorporated into medical formulations to prevent UTIs, offering a natural and effective option for combating bacterial infections

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