Comparative Analysis of Bacteriophages, Natural Antibacterials and Pharmaceutical Antibiotics Against Escherichia coli, Bacillus cereus and Enterobacter aerogenes

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World Health Organization reported that antibiotic resistance is a serious worldwide threat to human health. In United States, two million illnesses and 23,000 deaths are attributed to antibiotic resistant bacteria annually . This project investigates the potential effectiveness of bacteriophages and other natural alternatives to antibiotics in the face of this rising problem . A comparative analysis was performed using different phages such as T4/6, and a variety of natural antibacterial such as garlic and royal jelly, among others. These were compared to three pharmaceutical antibiotics: erythromycin, penicillin and streptomycin, in their effectiveness against four non-pathogenic bacteria: E.coli 12900 (a non-pathogenic strain of E. coli O157), Escherichia coli (E.coli), Bacillus cereus (B.cer), and Enterobacter aerogenes (E.aerogenes). My hypothesis was that bacteriophage would be most effective due to its specificity at targeting bacteria, effectively killing them by lysis after infection. Two methods were used to test the effectiveness of the different antibacterials, a plaque assay and a Zone of Inhibition (ZOI) assay. The plaque assay was used for both E.coli O157 and E. coli. The phage cocktail, natural antimicrobials and pharmaceutical antibiotics were compared through the ZOI assay. Garlic proved to be the most effective in the ZOI assay. The phages were effective against the E. coli O157. Research has shown phages have little to no known side effects or allergic responses and have a unique advantage of eliminating target bacteria without destroying beneficial flora. This study demonstrates that phages and other natural antimicrobials have the potential as effective treatments for certain bacterial infections and should be the subject of further research.

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