Antibiotic Combinations as an Alternative Strategy Against Bacterial Resistance in Pseudomonas aeruginosa and Staphylococcus aureus

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In the United Stated more than 2.8 million antimicrobial-resistant infections occur each year. According to CDC's (2025) AR Threats Report, more than 35,000 people die of this infection and these numbers are increasing rapidly after the COVID-19 pandemic. The bacterium Pseudomonas aeruginosa and Staphylococcus aureus were both classified as high priority by the WHO (2024). These have a high capacity to spread both in hospitals, communities, and prevalence of methicillin resistant in the Staphylococcus aeruginosa. It is urgent to identify effective strategies for their control. The purpose of this experiment was to evaluate combinations of antibiotics with a possible synergistic effect against these bacteria. The antibiotics selected for this study were oxacillin (O), trimethoprim (T), kanamycin (K), and erythromycin (E), which were evaluated in combination and individually. Our methodology consisted of the lawn culture method to inoculate the petri plate. Was used Mueller–Hinton Agar (MHA) promotes a better diffusion of the antibiotics. The bacteria were incubated at 35°C. To evaluate synergy, antibiotic discs were placed close together on the same petri plate. Among the combinations tested, oxacillin (3 mm) and erythromycin (25 mm) produced an inhibition zone of 30 mm when combined, representing a 20% increase in effectiveness compared to their individual effects in Pseudomonas aeruginosa, however, this combination did not show the same effect against Staphylococcus aureus. In conclusion, my results demonstrated synergy in one combination. Their future projections are the exploration of antibiotic combinations and their toxicity for potential clinical applications.

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