Abstract

Antimicrobial resistance has become one of the greatest global threats to health, food security and development. This crisis of antimicrobial resistance has led to research on alternative treatment of bacterial infection. Among the possible alternatives is the revival of phage therapy which was widely abandoned after the clinical availability of antibiotics in the mid-20th century in many countries. Based on this information, this study developed a three-species model with two predators (Bacteriophages and medication) and one prey (Pathogenic bacteria). The main aim of the study is to provide an insight on the interaction of the prey and predators as suitable alternative for the clinical treatment of bacterial infections using combination antibiotics and bacteriophages. The developed model factors in how the two predators function mutually to fight the prey. The local stability analysis of equilibrium points are carryout using Jacobian matrix method from the model. The stability of the model was found at \(\frac{\rho-\sigma}{\frac{2\rho\theta3}{K}-\mu\theta1}\)<1 which is the basic reproduction number of the model and clearly showed how a therapy of both medication and bacteriophages is effective. Numerical simulation was done using MATLAB to visualize the effects of various treatment combinations of the bacterial infection. The results showed that use of both bacteriophages and antibiotics can be effectively be used in the management of bacterial infections.