Abdul Faliq Anwar, 2019, **Analisis Kestabilan Model Matematika Ko-infeksi Virus Influenza A dan Pneumokokus pada Sel Inang**. Skripsi ini dibawah bimbingan Cicik Alfiniyah, M.Si., Ph.D. dan Dr. Windarto, S.Si., M.Si. Departemen Matematika, Fakultas Sains dan Teknologi, Universitas Airlangga, Surabaya.

ABSTRAK

Ko-infeksi virus influenza A dan pneumokokus adalah penyakit yang disebabkan karena sel inang terinfeksi virus influenza A dan bakteri pneumokokus dalam waktu yang sama. Tujuan dari skripsi ini adalah untuk menganalisis kestabilan titik setimbang pada model matematika ko-infeksi virus influenza A dan pneumokokus pada sel inang. Berdasarkan analisis model diperoleh empat titik setimbang, yaitu titik setimbang non endemik ko-infeksi (E_0), titik setimbang endemik virus influenza A (E_1), titik setimbang endemik pneumokokus (E_2) dan titik setimbang endemik ko-infeksi (E_3). Dengan menggunakan metode *Next Generation Matrix* (NGM) diperoleh dua nilai bilangan reproduksi dasar, yaitu bilangan reproduksi dasar virus influenza A (R_{0v}) dan bilangan reproduksi dasar pneumokokus (R_{0b}). Eksistensi dari titik setimbang dan kestabilan lokal titik setimbang bergantung pada bilangan reproduksi dasar. Titik setimbang non endemik ko-infeksi stabil asimtotis lokal jika $R_{0v} < 1$ dan $R_{0b} < 1$, titik setimbang endemik virus influenza A cenderung stabil asimtotis lokal jika $R_{0v} > 1$ dan $R_{0b} < 1$, titik setimbang endemik pneumokokus cenderung stabil asimtotis lokal jika $R_{0v} < 1$ dan $R_{0b} > 1$. Sedangkan titik setimbang endemik ko-infeksi cenderung stabil asimtotis lokal jika $R_{0v} > 1$ dan $R_{0b} > 1$. Dari hasil simulasi numerik menunjukkan bahwa kenaikan jumlah populasi virus influenza A dan pneumokokus mengakibatkan jumlah populasi sel yang terinfeksi virus influenza A dan pneumokokus (ko-infeksi) juga mengalami kenaikan.

Kata Kunci: Model Matematika, Virus Influenza A, Pneumokokus, Ko-infeksi, Kestabilan, Sel Inang.

Abdul Faliq Anwar, 2019, **Analysis Stability of Mathematical Model The Co-infection of Influenza A Virus and Pneumococcus in The Host Cell**. This undergraduate thesis is supervised by Cicik Alfiniyah, M.Si., Ph.D. dan Dr. Windarto, S.Si., M.Si. Mathematics Departement, Faculty of Science and Technology, Universitas Airlangga, Surabaya.

ABSTRACT

Co-infection of influenza A virus and pneumococcus is caused by influenza A virus and pneumococcus bacteria which infected host cell at the same time. The purpose of this thesis is to analyze stability of equilibrium point on mathematical model within-host co-infection of influenza A and pneumococcus. Based on anlytical result of the model there are four quilibrium points, non endemic co-infection equilibrium (E_0), endemic influenza A virus equilibrium (E_1), endemic pneumococcus equilbrium (E_2) and endemic co-infection equilibrium (E_3). By Next Generation Matrix (NGM), we obtain two basic reproduction number, which are basic reproduction number for influenza A virus (R_{0v}) and basic reproduction number for pneumococcus (R_{0b}). Existence of equilibrium point and local stability of equilibrium point dependent on basic reproduction number. Non endemic co-infection equilibrium is locally asymtotically stable if $R_{0v} < 1$ and $R_{0b} < 1$; influenza A virus endemic equilibrium is locally asymtotically stable if $R_{0v} > 1$ and $R_{0b} < 1$; pneumococcus endemic equilibrium is locally asymtotically stable if $R_{0v} < 1$ and $R_{0b} > 1$. Meanwhile, the co-infection endemic equilibrium is locally asymtotically stable if $R_{0v} > 1$ and $R_{0b} > 1$. From the numerical simulation result, it was shown that increasing the number of influenza A virus and pneumococcus made the number of population cell infected by influenza A virus and pneumococcus (co-infection) also increased.

Keyword: Mathematical Model, Influenza A Virus, Pneumococcus, Co-infection, Stability, Host Cell.