

ABSTRAK

Coronavirus Disease 2019 (Covid-19) disebabkan oleh penyakit virus corona yang mewabah dunia pada tahun 2020. Virus corona pertama kali muncul di Provinsi Wuhan, China. Pada Desember 2019, wabah Covid-19 menyebar hingga lebih dari 24 negara salah satunya negara Indonesia. Aceh merupakan salah satu provinsi di Indonesia yang terkena pandemi Covid-19. Penderita mengalami gejala seperti demam (suhu $> 38^{\circ}\text{C}$), batuk, sesak nafas, kelelahan, pilek, nyeri tenggorokkan, susah menyium aroma, dan diare. Pada data covid-19 di Provinsi Aceh menunjukkan bahwa terjadinya penularan yang cukup pesat yaitu 13.581 jiwa dan kematian 552 pada Februari 2020 hingga 22 Mei 2021. Oleh karena itu penelitian ini bertujuan untuk mengetahui model penyebaran penyakit COVID-19 dan analisis kestabilan model penyakit COVID-19. Model ini melibatkan 4 kompartemen populasi yaitu Susceptible (S), Exposed (E), Infected (I), dan Recovered (R). Data penelitian ini diperoleh dari Dinas Kesehatan Aceh dan Badan Pusat Statistika (BPS) Aceh serta Dinas komunikasi, informatika, dan persandian Aceh. Berdasarkan hasil penelitian ini menunjukkan bahwa model matematika SEIR stabil pada penyebaran penyakit Covid-19 yang ditandai terdapat dua titik kesetimbangan yaitu titik kesetimbangan bebas penyakit dan titik kesetimbangan endemic dengan akar-akar persamaan karakteristik bernilai $-0,015$ dan $-0,00612264$. Selanjutnya dengan menggunakan NGM maka diperoleh hasil R_0 sebesar 189,496 jiwa yang berarti setiap satu penderita dapat menularkan penyakit berkisar 190 jiwa.

Kata kunci: COVID-19, SEIR, *Basic Reproductive Ratio*, Titik Kesetimbangan

ABSTRACT

Coronavirus Disease 2019 (Covid-19) is caused by a corona virus disease that is endemic to the world in 2020. The corona virus first appeared in Wuhan Province, China. In December 2019, the Covid-19 outbreak spread to more than 24 countries, one of which is Indonesia. Aceh is one of the provinces in Indonesia that has been hit by the Covid-19 pandemic. Sufferers experience symptoms such as fever (temperature $> 38\text{ }^{\circ}\text{C}$), cough, shortness of breath, fatigue, runny nose, sore throat, difficulty smelling aromas, and diarrhea. The Covid-19 data in Aceh Province shows that transmission occurred quite rapidly, namely 13,581 people and 552 deaths from February 2020 to 22 May 2021. Therefore this study aims to determine the model of the spread of the COVID-19 disease and analyze the stability of the COVID-19 disease model. 19. This model involves 4 population compartments namely Susceptible (S), Exposed (E), Infected (I), and Recovered (R). Data for this study were obtained from the Aceh Health Service and the Aceh Central Statistics Agency (BPS) as well as the Aceh Communications, Informatics and Coding Services. Based on the results of this study, it shows that the SEIR mathematical model is stable in the spread of the Covid-19 disease which is characterized by two equilibrium points, namely the disease-free equilibrium point and the endemic equilibrium point with the roots of the characteristic equation worth -0.015 and -0.00612264 . Furthermore, by using NGM, the R_0 result was 189,496 people, which means that every one patient can transmit the disease around 190 people.

Key Word : COVID-19, SEIR, Basic Reproductive Ratio, Balance Point