Mathematical analysis for transmission dynamics of COVID - 19 pandemic with vaccination and other non pharmaceutical control strategies: A case study of South Africa BIOMATH 2024

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Coronavirus (COVID - 19) is one of the most fatal human viral disease recorded globally originated from Wuhan- Hubei Province, China. A Mathematical model for transmission dynamics of COVID - 19 pandemic is presented and rigorously analyzed. Pharmaceutical (vaccination, hospitalization) and other control (face-mask, social distancing, environmental hygiene) strategies are incorporated to measure the level of curving the disease in a population. Basic properties of the model are proved and a control reproduction number is computed. Moreover, global attractiveness of equilibria are analysed. Sensitivity analysis on control reproduction number is conducted to determine relevant parameters that derive the severity of the disease. Using data from South Africa, we determined the percentage of population to be vaccinated in order to control the disease. Numerical simulations are used to illustrate our findings.

References

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