University of Venda
Mathematical Modelling of Cholera Immunology

by

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Abstract

Cholera is still regarded as an illness that causes morbidity and mortality, more especially in developing countries. Cholera is an acute, diarrhoeal illness caused the bacterium Vibrio Cholerae (V. Cholerae), which is found in marine waters. This disease is acquired mainly by ingesting food or water contaminated by faecal material from patients or carriers. Mathematical models are used to outline how infectious diseases progress, to show the likely outcome of an epidemic and help inform public interventions. Mathematicians have used epidemiological models to study more about the dynamics of cholera. Epidemiology is about patterns in space and also time of the disease. Out of the patterns we may infer the causes of the disease. In addition, the future of the disease can be predicted and hence decisions regarding the need for control measures can be made. The immune response to disease agents should also be considered. The immune system is a collection of mechanisms that protect against infection by identifying and killing the invading pathogens. Mathematicians have ignored the study of cholera immunology. The aim of this study was to understand cholera immunology. We have developed the basic mathematical model of cholera immunology. Secondly we extend the model by partitioning the immune system in general to phagocytes and lymphocytes. We have learned that the decay rate of immune cells in an individual is not good. People must have strong immune system so that they can fight cholera infection. We recommend that future studies should focus on the development of immuno-epidemilogical model and also to include treatment on the model.