Mathematical Models of Infectious Diseases and Social Issues

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Chapter 11
Vertical Transmission of Syphilis With Control Treatment

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ABSTRACT

Syphilis is a sexually transmitted disease having different signs and symptoms with four main stages, namely primary, secondary, latent, and tertiary. Congenital (vertical) transmission of syphilis from infected mother to fetus or neonatal is still a cause of high perinatal morbidity and mortality. A model of transmission of syphilis with three different ways of transmission, namely vertical, heterosexual, and homosexual, is formulated as a system of nonlinear ordinary differential equations. Treatment is also incorporated at various stages of infection. Total male and female population is divided in various classes (i.e., were susceptible, exposed, primary and secondary infected, early and late latent, tertiary, infected treated, latent treated, infected child [newborn], and treated infected child [at birth time]). Stability of disease-free equilibrium and endemic equilibrium is established. Control treatment is applied. It is observed that safe sexual habits and controlled treatment in each stage including pregnancy are effective parameters to curb disease spread.

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