

STABILITY ANALYSIS OF A VACCINATED EPIDEMIC MODEL WITH TIME DELAY

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ABSTRACT

The spread of communicable diseases depend on the rate of transmission or contact removal rate, mode of transmission, latent and incubation period, age – specific susceptibility and immunity of individuals to the disease. The immunity to specific diseases in individuals can be artificially developed with the help of vaccination. It is assumed that this leads to complete protection and vaccinated individuals are immune but this is not true, and in general vaccination only leads to partial protection. The role of latent period in the dynamics of communicable diseases is also an important factor and should be considered in the epidemic models. Furthermore while studying age-structured epidemic models, the maturation period should also be considered, because as seen in the case of several infectious diseases, the populations of certain age-groups are immune from diseases for a finite period but after that they become susceptible.

In view of the above, in this paper, a delay epidemic model has been studied to investigate the effect of the age-based vaccination policy on the dynamics of a communicable disease incorporating latent period and maturation delay. For the model, the disease- free and endemic equilibrium points have been obtained and their local and global stability analysis have been carried out.

KEY WORDS: Incubation period, Immunity, Maturation delay, Global Stability