Modelling the transmission dynamics of HIV/AIDS with treatment and logistic population growth

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A nonlinear mathematical model is proposed to study the transmission dynamics of HIV/AIDS with treatment and logistic population growth. In modelling the dynamics of the system, the population is divided into four classes namely: HIV negative but susceptibles, HIV infective, HIV infectives that are under therapy and full blown AIDS patients. Positivity and boundness of solutions are analysed quantitatively. Sensitivity indices of the reproductive number ‘ ’to the parameters in the model are calculated. The existence and stability of the disease free and endemic equilibrium points are also analysed. It is found that using Routh Hurwitz criteria, the disease free equilibrium point is locally asymptotically stable when and unstable when . Centre manifold theory is employed to show that the endemic equilibrium is locally asymptotically stable when the reproduction number is less than unity. 0 R 0 1 R□0 1R □By using computer simulation, it is shown that using therapy (ARVs), the spread of the disease can be reduced significantly and also the equilibrium values of the HIV infective and AIDS population can be maintained at desired levels. A numerical study of the model is also used to investigate the influence of certain key parameters on the spread of the disease.