The role of incidence function in HIV transmission model with control measures

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This work addresses the role of the choice of incidence function in HIV transmission model with control measures. The threshold and equilibrium for the model are determined and stabilities are examined. Qualitative results show that the model has two equilibria; the disease free equilibrium point which is stable (locally and globally) when the effective reproduction number, $R^{9}* < 1$ and $R^{s}{}_{e}{}^{at\prime} < 1$ for standard incidence and saturated incidence respectively, the endemic equilibrium point appear when the effective reproduction number is bigger than unity, that is, Rf > 1 and $R™^{1\prime} > 1$ for standard incidence and saturated incidence respectively. Further, the model does not exhibit the phenomenon of backward bifurcation where a stable disease- free equilibrium coexist with a stable endemic equilibrium for a certain range of associated reproduction number less than unity for both incidence functions. Numerical results suggest that control strategies are important to reduce or eradicate the disease transmission for both incidence functions and saturated incidence give larger number of secondary infections compared to the standard incidence. Therefore this study suggests that educational campaigns to susceptible individuals should be conducted across the country to educate people on the disease transmission and prevention strategies so as to reduce the spread of the disease. In addition, early treatment to diagnosed individuals is very important and it should be made affordable to HIV infectives. From the analytical as well as numerical results obtained in this study, standard incidence is better in HIV models compared to the saturated incidence.