Modelling the effects of temperature variation on Schistosomiasis transmission dynamics

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Abstract

Schistosomiasis ranks second behind malaria in terms of its social, economic and public health impact in tropical and subtropical regions of the world. In this study a non-linear mathematical model is formulated to study the effects of temperature variation on Schistosomiasis transmission in the population. Mathematical features of the model such as the reproduction number, the equilibria, and its stability is carried out. The model results revealed that, the disease free equilibrium point is locally asymptotically stable when R0 > 1 and unstable when R0 > 1. The endemic equilibrium is locally asymptotically stable for R0 > 1, and otherwise undergoes backward bifurcation. Sensitive indices of parameters in the basic reproduction number R0 are evaluated. The infection rate Ø (T) is temperature dependent and there is high infection with rise in temperature and low infection with decrease in temperature. It is shown that the periodic outbreaks of infectious snails to the aquatic environment are followed by epidemic outbreaks in the human population. Our conclusion is that an integrated and sustainable approaches are required to control the disease transmission by taking into consideration the seasonal fluctuations of population densities of the intermediate hosts and the pathogens due to temperature variation.