

Mathematical modelling of Hepatitis E Virus (HEV) and Chronic Myeloid Leukemia (CML) co-infection dynamics

Denis Kagyera Katakara, Mbarara University of Science and Technology, Mbarara,

Uganda Chirove Faraimunashe, Kwa-Zulu University, Natal, South Africa

Abstract

There are major advances which have been made to understand HEV and CML transmission dynamics but none of these have considered the effects of transmission parameters on the burden of HEV on CML prevalence in a co-infection scenario. In this paper we formulated a mathematical model for the co-infection of HEV and CML using a system of ordinary differential equations, in order to understand the effects of the co-infection on HEV and CML and vice versa in a human population. The model was analysed and steady state conditions were derived. Our results showed that the disease free equilibrium was both locally stable and globally stable if the basic reproduction number, $R_0 \leq 1$ and unstable if the basic reproduction number, $R_0 > 1$. Our results also suggest that, (i) HEV reduces the CML infectives and accelerates the co-infection, (ii) CML enhances the progression of both HEV infection and the co-infection and, (iii) there is an increase in HEV-CML burden due to coinfection compared to single infections of either HEV or CML.