World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:9, No:12, 2015

An Optimal Control Model for the Dynamics of Visceral Leishmaniasis

Authors : Ibrahim M. Elmojtaba, Rayan M. Altayeb

Abstract : Visceral leishmaniasis (VL) is a vector-borne disease caused by the protozoa parasite of the genus leishmania. The transmission of the parasite to humans and animals occurs via the bite of adult female sandflies previously infected by biting and sucking blood of an infectious humans or animals. In this paper we use a previously proposed model, and then applied two optimal controls, namely treatment and vaccination to that model to investigate optimal strategies for controlling the spread of the disease using treatment and vaccination as the system control variables. The possible impact of using combinations of the two controls, either one at a time or two at a time on the spread of the disease is also examined. Our results provide a framework for vaccination and treatment strategies to reduce susceptible and infection individuals of VL in five years.

Keywords : visceral leishmaniasis, treatment, vaccination, optimal control, numerical simulation
Conference Title : ICMCS 2015 : International Conference on Mathematics and Computational Science
Conference Location : Bangkok, Thailand
Conference Dates : December 17-18, 2015