F03   Modeling and optimal control of lymphatic filariasis disease

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Abstract. We propose and analyze a compartmental nonlinear deterministic mathematical model for the Lymphatic Filariasis disease and optimal control strategies. The model is studied qualitatively using stability theory of differential equations and the basic reproduction number that represents the epidemic indicator is obtained from the largest eigenvalue of the next-generation matrix. The local and global asymptotic stability conditions for disease-free equilibrium are determined and the sensitivity analysis is performed. The optimal control problem is designed by applying Pontryagin maximum principle with three control strategies. Numerical results for the lymphatic filariasis dynamics and its optimal control revealed that a combination of prevention through the use of bed-net and annual mass treatment is the best strategy to eradicate the disease.

KEYWORDS: Lumphatic filariasis, optimal control, pontryagin maximum, mathematical model.