Abstract

Lyme disease is the most common vector borne disease in the United States. The incidence rate of Lyme disease has been on the rise since it was defined in 1977. From 2000 to 2016, there were over 18,000 cases of Lyme disease diagnosed each year. Of all the confirmed cases of Lyme disease in the United States, 95% occur in the Northeastern and Midwestern states. Lyme disease is contracted by a bite from an infected tick, *Ixodes scapularis*. This research aimed to find the hot spots of Lyme disease and the environmental risk factors, determine the counties that are hot spots in the Lyme disease rate and climate variables maps, and to create a model to test the influence of the variables. Past studies of Lyme disease created risk maps that centered on regression analysis. This study goes a step further to include trend analysis of Lyme disease and the environmental factors while considering spatial and temporal factors.

This study investigated the spatiotemporal trend of the Lyme disease spread rate and environmental factors using hot spot analyses and local Moran's I. A space time cube of these factors was generated and emerging hotspots over 16 years of time period (2000 – 2015) were analyzed. The hot spots were used to identify the correlations of Lyme disease and climate factors. An ordinary least square regression was used to evaluate the relationships between Lyme disease and the environmental risk factors to create an inferential model of Lyme disease. Spatial and temporal environmental risk factors included were precipitation, minimum, mean, and maximum temperature, latitude, longitude, percent forest cover, and year. The variables found to be most significant were year, longitude, latitude, and mean temperature, and explained 14.4% variance of Lyme disease rate in the study area. The significant spatiotemporal environmental factors identified provide researchers and public health officials with updated key factors, and can be used to educate the general public on high-risk areas in the northeastern United States.