

A survey of variability relationship between temporal variations of temperature and Cutaneous Leishmaniasis disease in Isfahan Province

Majid Javari*

Assistant Professor of Climatology, College of Social Science, Payame Noor University, Iran

Kiana Shirani

Assistant Professor of Infectious Diseases, Acquired Immunodeficiency Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Zahra Karimi

M.Sc. Student in Climatology, Payame Noor University, Isfahan, Iran

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Extended Abstract

Introduction

Changes of climatic elements such as temperature on a temporal scale follow different patterns under various trend and seasonal models. Associated with these changes, many environment elements are affected. One of the most important effects of climate is on health. Cutaneous Leishmaniasis (CL) is one type of disease caused by protozoan parasites of the genus *Leishmania* and localized CL in various countries as stated by Alvar et al. (2012). The agent of this disease is transmitted into the skin of mammalian host by a kind of female sand flies. CL is a major neglected tropical disease (Alvar et al., 2012) with a complex ecology, whose transmission, in the New World, requires the co-existence of vectors, reservoirs and humans. The importance of temperature variations and anomalies for temporal variations in the diseases has been well recognized. Temperature variations can enhance diseases through environmental process.

Materials and Methods

Study region ($^{\circ}$ N, $^{\circ}$ E) is approximately 33 km² and situated in the center of Ira. It is ranged from 25^o 3' to 39^o 47' N and from 44^o 5' to 63^o 18' E. We want to make identification of temperatures effects on CL in order to better forecast the CL variations in Isfahan Province. With regard to temperature changes in Isfahan Province, we chose 13 stations. The temperature was obtained from meteorological organization and included the monthly, seasonal and annual information of 13 stations in Isfahan Province for the period of 1979-2014. All the observed temperature data have been subject to strict quality control obtained from <http://www.irimo.ir/eng/wd/720-Products-Services.html>. The study focused on monthly and seasonal variations. The CL data were obtained from Heath Center of Isfahan and Kashan Heath Center and included the monthly, seasonal and annual information of 13 cities in Isfahan Province.

* E-mail: majid_javari@yahoo.com

Tel: +98 9133285930

Study of temperature trend on CL changes is based on exploratory and confirmatory analyses with the incorporation of trended and non-trend patterns of predictor variables on response variables. Trend model is a multivariate statistical method that uses factor analysis to evaluate the relationship between temperature and CL (Paul & Anderson, 2013). Application of this technique in climatology leads to this question of how the trend pattern among temperature variables and the CL factors are studied. Trend model analysis can be used to answer this question. We studied the possible trend patterns between temperature and CL. Upward and downward trends of temperature on CL is highly related to the relationship link between temperatures and CL. Nevertheless, temperature could influence CL with only no direct link between temperature and CL.

Results and Discussion

The temperature and CL trends are addressed about the effects of temperature variables or the variables which are not directly observable. These temperature variables are measured by several trend models. Concerning the relationship of temperature trend on CL, three indicators of monthly, seasonal and annual temperature indices and CL data were studied with respect to research model. The test of the model is done along with testing the measurement model, analyzing and forecasting models. Hence, the distribution of temperature and CL data showed a suitable time series patterns. Also, the results show that the series of temperature have an acceptable trend and the mentioned constructs of research have a suitable diagnostic trend. Also, the results show that the series of CL disease have an acceptable seasonality in the stations. The mentioned constructs of the research have a suitable diagnostic seasonal pattern. In order to evaluate the relationship of temperature elements trend and CL disease, linear model to being noncompliance into trend model, the data from analysis model were extracted, and the forecasted temperatures relationship to CL disease were obtained.

Conclusion

A primary purpose of our study was zoning of temperature and CL data trend. Our other aim was to examine the relationship of the temperature and CL disease trend in causal indicators. The results indicated that there are relationship of trend between temperature and CL disease in Isfahan province. The findings of this study also indicated that among the temperature values influential on CL disease, the monthly temperature factor had the highest effect on the rate of CL disease. The results show that temperature and disease are followed to a seasonal pattern, with the highest (lowest) cases in autumn (spring) season with a seasonal time delay to the maximum (minimum) temperature in summer winter.

Keywords: *Cutaneous Leishmaniasis, disease, Isfahan Province, temperature, trend.*