

Investigation of the relationship between thermal sensation and hospital admissions of cardiovascular patients in Kermanshah

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Extended Abstract

Introduction

In recent years, urban developments have created changes in the climate. Such changes affected the sustainability of the natural environment and the rate people's health is affected, especially in cities. If the human body is an environment warmer so that skin surface begins to absorb the heat and in the colder environment gradually loses its heat. In addition, the air moisture has affected evaporation capacity and amount of cooling by evapotranspiration. At 20 to 25 degrees, the air humidity has almost no effect on human and relative humidity about 30 to 85 percent. In more than 25 ° C, the effect of air humidity on the human being is gradually increased, because the hot and humid conditions of evaporation and transpiration of Human body is reduced and led to nervous tension. On the other hand, dry air also creates problems for the respiratory mucosa. Increasing duration of the heat also has a significant impact on the daily mortality. Duration of cold and heat also has effects on resonance of some diseases. Thus, in tropical climates, coronary heart disease during cold periods has shown a significant increase. In the present study, Kermanshah bioclimatic conditions were identified using several indicators. Relationship between bioclimatic conditions determined by each of those indices was evaluated with cardiovascular disease admissions in Kermanshah individually.

Materials and methods

In this study, two types of data are used to assess the bioclimatic conditions and their relationship with Kermanshah cardiovascular admissions. In other words, the set of climate variables from synoptic station of Kermanshah and cardiovascular admissions of Imam Ali Hospital of Kermanshah were selected for analysis as samples. We used Atmospheric variables including average temperature (°C), wind speed (meters per second), relative humidity

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(percent), solar radiation (watt per square meter), height or sun angle (degrees) and dew point temperature ($^{\circ}\text{C}$), cloudiness (Octa), water vapor pressure (hPa), as well as statistics about the number of daily admissions for cardiovascular patients. Although data on atmospheric variables in Kermanshah station were available in the long term, but due to lack of information about the admissions of cardiovascular disease, we selected the period of the day from September 9 2009 to April 30 2015 to determine the relationship between them. The data related to cardiovascular patients admission in Imam Ali Hospital of Kermanshah were collected. A database of this information was provided during the period. Another database of meteorological variables (average temperature, relative humidity, wind speed, solar radiation, water vapor pressure and the height of the sun) was created on a daily basis for the same period. Based on this database, bioclimatic conditions of Kermanshah on a daily basis were identified. In this study, two software RayMan and BioKlima was used to determine bioclimatic conditions of Kermanshah. PET and PMV bioclimatic indices were calculated based on RayMan software. Finally, the link between acceptance of cardiovascular disease and each bioclimatic conditions in Kermanshah individually through statistical tests (Levene test, Univariate Analysis of Variance, Scheffe and Games-Howell post hoc) were investigated using SPSS software.

Results and discussion

Generally, investigation about the relationship between bioclimate indices and cardiovascular disease in the Kermanshah showed that acute climatic conditions are the most important factor in the increasing acceptance of cardiovascular disease in Kermanshah. In other words, under the cold, hot and sultry conditions, Admission cardiovascular patients in Kermanshah had significant increase compared with the climatic comfort condition. In general, based on the results of this study it can be said that in each index, one or two different bioclimatic conditions were effective on the hospital admissions of cardiovascular patients. For example, based on Tek index slightly sultry have been effective in increasing cardiovascular diseases. In the slightly sultry conditions, every day 20 people on average are referred to the Imam Ali hospital. Moreover, in cold conditions, an average of 19 people admitted with cardiovascular disease. Meanwhile at the thermal comfort condition we found the lowest rate of hospital admissions. In fact, at the confidence level 95 percent, there is significant difference in the number of cardiovascular patients in sultry and cold condition compared with thermal comfort. Therefore, based on Tek index cold and sultry conditions are effective in increasing hospital admissions and simultaneously with the occurrence of thermal comfort a significant reduction has been observed in the mean number of patients. In fact, this index relationship between extreme conditions with an increase in cardiovascular admissions is approved. Among other indices, TE index showed direct correlation between hot and warm conditions with increased hospital admissions. The results of PMV and PET indices also indicated that cold and cool bioclimatic conditions (generally tend to cold conditions) more than the warm and comfort conditions are effective on the admission of cardiovascular patients. As a conclusion, we can say that extreme bioclimatic conditions (very cold or hot and sultry) are directly related to the increase in cardiovascular disease in Kermanshah. Under comfort or close to the comfort condition, the hospital admissions have been lower.

Conclusion

The results of this study showed that in each index, one or two bioclimatic conditions have been effective in increasing admissions of cardiovascular patients. For example, based on Tek index, there is significant relationship between extreme conditions (very hot and very cold) with increase in cardiovascular admissions in 95 percent confident level. But in the TE index, a significant correlation was seen between warm and hot conditions with increase in cardiovascular admissions in the confident level 95 percent. Based on the PMV and PET indices cool and cold bioclimatic conditions (in general tend to cold conditions) are affected by warm and comfort conditions on the acceptance of cardiovascular patients. Finally, the results of most indicators suggest that acute climatic conditions (very cold or hot and sultry) are directly related to increase in cardiovascular disease in Kermanshah.

Keywords: *bioclimatology, cardiovascular disease, Kermanshah, thermal stress.*

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