EMS Annual Meeting Abstracts
Vol. 11, EMS2014-31, 2014
14th EMS / 10th ECAC

Human thermal bioclimatic conditions associated with respiratory diseases in Crete Island, Greece

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The objective of this study is to assess and analyze the human bioclimatic conditions of Crete Island and quantify the association between these conditions with daily counts of admissions for respiratory diseases. The medical data were obtained from two main hospitals in Heraklion, Crete Island, during five-year period 2008-2012. The bioclimatic conditions analyzed concern two human thermal indices, the Physiological Equivalent Temperature (PET) and the Universal Thermal Climate Index (UTCI) calculated by "RayMan" model, which is well-suited to calculate radiation fluxes and human biometeorological indices. Mean daily meteorological parameters, such as air temperature, relative humidity, wind speed and cloudiness, were acquired from the meteorological station of Heraklion (Hellenic National Meteorological Service). These parameters were used as input variables in modeling the aforementioned thermal indices, in order to interpret the grade of the thermo-physiological stress.

Crete Island is a climate-sensitive area, facing exacerbating atmospheric conditions due to frequent Saharan dust episodes especially during spring and summer periods, when the development of suitable synoptic meteorological conditions often occurs. Cretan mountains are orientated perpendicularly to the southwest air mass flow, generating Föhn winds - hot and dry winds - which have an effect on prevailing bioclimatic conditions.

The performed analysis revealed the impacts of cold weather in exacerbating the respiratory admissions in Heraklion city. Additionally the Sahara dust episodes, mainly occurred in spring are often associated to Föhn winds, exacerbating the biometeorological conditions (heat stress) in Heraklion. The combination of such natural phenomena, contribute synergistically to the high hospital admissions for respiratory symptoms. Taking into account the oncoming climate change, these natural phenomena are very likely to appear more frequently, due to droughts and higher air temperatures, leading in increased respiratory impacts.