

Title: Weather and Pollutants Related Incidence of Asthma and Rhinitis

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Background and Objective: Over the last decades, a worldwide increase of respiratory diseases has been experienced. The study aimed to identify those weather types that are either influential in increasing patient numbers of respiratory diseases or are negligible in triggering asthma and rhinitis. The database comprises daily values of 13 meteorological parameters, 8 chemical and 8 biological pollutants, and the number of patients for the period 1999-2003 in Szeged, Hungary. In the summer to early autumn period a total of 26,703 patients, while in the winter months a total of 14,507 patients, registered with respiratory diseases were considered.

Methods: An objective definition of the characteristic weather types was carried out by using factor and cluster analysis. ECMWF ERA 40 database was used to determine the average sea level pressure field of the weather types retained. Significance analysis of the differences in the calculated means of the air pollutants and the disease data between the resultant weather types was performed by one-way analysis of variance (ANOVA) and Tukey test.

Results: Characteristic relationships between the weather types and patient numbers were detected in the summer to early autumn period. Weather type 7, with a weak anticyclonic ridge character and the highest patient numbers, was linked to high temperature parameters, low relative humidity, as well as high chemical and biological pollutant levels. At the same time, type 2 (anticyclonic ridge character) was associated with the lowest patient numbers and was characterized by high temperature and medium relative humidity parameters, as well as high levels of chemical and low levels of biological air pollutants.

Conclusions: Results on the relationships of the meteorological parameters and chemical air pollutants, as well as weather types, can be built into a model to predict, and in this way to prepare for, days of severe risk of respiratory illness.