Influences of pollution and weather on obstructive respiratory tract diseases of children in Berlin (West)

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During the period July 1979 to June 1982 the frequency of children living in districts of Berlin (West) with different load of air pollution and suffering from obstructive diseases of the airways were investigated (Fegeler, Moyzes, Wedler, Eberhard 1985). The data basis was the patients' rate of those children living in the 75% supply areas (SAH) of the Neukölln children's hospital (NK) and the Rittberg children's hospital (RK) (Fig. 1). The air pollution load of 75% SAH NK was average higher than that of RK. Air pollution was registered by 31 measuring points representing the Berlin air quality measuring network (BLUME). The values of each measuring point were representative for a nearly 16 km² area (BLUME-area). Since 1984 the influence of allergenic strain caused by pollen during the vegetation period is investigated (Wedler et al. 1986).
Data Basis, Parameters of Investigation

1. Independent variables: The values of $SO_2$ concentration obtained by BLUME were used as an indicator of gaseous and dusty air pollution (Fig. 1). The corresponding meteorological parameters are: the equivalent temperature as an indicator for the cooling load of the mucosa of the respiratory tract (MRT) while staying outdoors and the relative humidity of indoor climate (RHIC) indicating the desiccation load of MRT indoors (FECELER et al. 1985). These data were provided by the measuring devices of the Meteorological Institute of the Free University Berlin, Berlin-Dahlem.

2. Dependent variables: The dependent variable "patients' rate" (PR) was defined as the daily number of children under medical treatment provided by either first aid care or taking up in one of the hospitals (hospital care). In the course of the examination period the children's department of NK gave medical care to 1.085, the RK to 297 patients suffering from obstructive respiratory tract diseases (ORTD). 83% belonged to the age group 0-6 years. The average distribution of age shows its maximum at the first (NK) or second (RK) year of life. Boys fell ill 1.8 times more often than girls.

Methods of Evaluation

Regarding the time series of daily PR, a remarkable interdiurnal variation is noticeable within the weekly rhythm with peaks on Saturdays, Sundays and Wednesdays corresponding to the closing hours of pediatrician-practices. These weekly rhythms which did not depend on air pollution or weather conditions were eliminated. Independent and dependent variables were correlated for the same time and with regard to the influence of incubation periods with time lag (linear and univariate correlations). Furthermore, partial multivariate correlations were computed.

Meteorological and Air Quality Characteristics of the Examination Period

The maximum of $SO_2$ concentration in the winter 1979/80 was the highest ever registered by BLUME since the beginning of $SO_2$ measurements in 1975 while it was lowest in winter 1980/81. The maximum of January 1982 showed average values. As mean $SO_2$ concentration for the 75% SAH of NK 156 $\mu g/m^3$ were registered for the invernal periods (Nov to Feb) 1979/80 to 1981/82 while the corresponding value for RK amounted to 128 $\mu g/m^3$.

Several cold periods occurred during the winter periods 1979/80 and 1981/82 due to weather conditions with poor vertical and horizontal exchange. During