

AN APPROACH TO THE ASSESSMENT OF THE COMBINED IMPACT OF SOME AMBIENT AIR POLLUTANTS ON THE RESPIRATORY SYSTEM OF CHILDREN

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Background and Aims: Assessment of the type of combined harmful impact produced by the most important ambient air pollutants (NO₂, SO₂, particulate matters) on the respiratory system in a specific environment could allow the uncertainty in risk assessment to be reduced. We approached such assessment based on toxicological concepts ("additivity", "subadditivity, or antagonism", "superadditivity, or synergy") applied to the data of an epidemiological study.

Methods: We analyzed the data of a questionnaire-based survey of 5085 primary schoolchildren in 13 areas of 10 Russian townships and the results of a year-long monitoring of ambient air pollution with the above-mentioned substances in these areas. The assessed respiratory response was the presence of cough for at least 3 months during the year. The association of this response with the impact of pollutants was investigated by translating pollutant concentrations into categorical form (below or above the median value), with the effects of the most essential confounders eliminated by means of database restriction. Restriction was carried out for two risk factors: smoking of adults in the presence of the child and the use of gas ovens for home heating and linen drying. Such restriction reduced the dataset to 1965 children, for which two-level charts for cough probability dependence on pollutant levels were constructed, and correlation analysis was carried out.

Results: It has been shown that, at the levels of ambient air pollution which are characteristic of the environmental situation considered, the combined respiratory impact of SO₂ and NO₂ is less than additive, that of SO₂ and PM₁₀ is additive, and that of SO₂ and PM_{2.5} is more than additive.

Conclusions: It has been demonstrated that it is possible to estimate the combined impact of ambient air pollutants on the respiratory airways if the effects of other strong potential risk factors are eliminated by means of dataset restriction.