Exposure risks to particulate matters PM\textsubscript{10} in some urban areas in the South Moravia Region

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The concentrations of PM\textsubscript{10} were obtained from the previously reported Ambient Monitoring of 13 towns and villages of the South Moravia including urban areas with an increased PM\textsubscript{10} concentration. As the reference method for PM\textsubscript{10} measurement a gravimetric method was used for most of locations (excepting TEOM method, based on the oscillating microbalance used in Hodonín and RADIO method, based on the β-absorption used in Brno Kotlářská ). The PM\textsubscript{10} and its inorganic toxic content concentrations were mainly obtained from 56-days measurement (8x7-days campaigns regularly distributed during one year 2003/2006 period). The aerosol content was analyzed for important toxic elements As, Cd, Ni and Pb by atomic absorption spectrometry (AAS).

Results

Health risk due to the PM\textsubscript{10} exposure is based on epidemiological studies. The methodology by Kristin Aunan was used for a characterization of the relative risk and/or odds ratio. As an indicator of the morbidity due to PM\textsubscript{10} long-term exposure (annual mean concentration) a chronic bronchitis for children population was taken. The number of children bronchitis cases varies from about 3% to 7% of children population in South Moravia Region (fig.1) depending on the levels of the increased annual mean of PM\textsubscript{10} concentrations.

The cancer risk assessment due to long-term exposure to the toxic inorganic content of PM\textsubscript{10} (As, Cd, Ni, Pb) is based on the US EPA methodology. As the fig. 3 indicates, the cancer risk expressed as ILCR is lower than the acceptable value (which is defined as 1x10\textsuperscript{-6}) for adults. For children population, the cancer risk is just in range of acceptability. There is almost no difference among the big towns and villages. These results are warning especially for children population, because of the presence of other pollutants with a carcinogenic potential as PAH, PCB, PCDD/F which can be adsorbed on particulate matters or gaseous pollutants as benzene, 1,3 - butadiene (mostly from traffic source) and which are not taken into account of cancer risk calculation.

Conclusions

The health risks for the most of monitored localities in the South Moravia Region due to PM\textsubscript{10} exposure are significant. The most affected localities are the towns and the villages close to important highways though the local heating sources are a considerable source of PM\textsubscript{10} as well. The results of the health risk assessment approximately correspond to the real health state of the South Moravia Region population declared by the Institute of Health Information and Statistic of the Czech Republic.