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ORIGINAL PAPER

Effect of selected environmental pollutants on hypertension in chosen regions of Poland

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Abstract

Heavy metals are major pollutants in urban environments, affecting their inhabitants by having adverse effects on human health, and implicating as causes of many civilization diseases, for example cardiovascular disease. The main objective of our study was to evaluate the relationship between selected environmental pollutants, including mainly nitrogen dioxide, nitrogen oxide, benzo(a)pyrene, and others, on the risk of hypertension. Data on mortality, morbidity, and hospitalization rates by city, sex, age, and ICD-10 classification were obtained from ProfiBaza. Data from air quality monitoring stations were sourced from the Chief Inspectorate of Environmental Protection. We analyzed the annual mean values of 10 air pollutants from 2017 to 2019 in 30 Polish cities. Values from these datasets were combined, and the Pearson correlation and Lasso regression analyses were performed. A positive correlation was observed between MR, SMR, HR, SHR, and levels of Benzo(a)pyrene, PM_{10}, $PM_{2.5}$, and SO2. Stronger positive correlations between benzo(a)pyrene, PM_{10}, $PM_{2.5}$, and SO_2 with MR and SMR were found in males compared to females, while correlations with HR and SHR were lower in males than in females. The Lasso regression analysis revealed that HR (0.42) had the highest explanatory power, while SMR (0.05) scored the lowest. MR was most positively influenced by $PM_{2.5}$ (2.91), while HR was most strongly affected by PM_{10} (139.78) and As (56.71). A comprehensive concerted regulatory plan and a program of health-promoting interventions should be developed and implemented to reduce urban residents' exposure to environmental factors, inducing, among other problems, cardiovascular disorders, including hypertension. Public awareness of the above compounds and individual action strategies to mitigate their impact should be promoted. The ubiquity of these pollutants is a serious public health threat, and should be strictly controlled by all possible national and independent institutions, especially pro-health ones.

Keywords: environmental pollution, hypertension, external factors, analysis model, toxic/heavy metals

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