Pollutants linked to reduced height and body mass

A recent study has investigated how exposure to a variety of environmental pollutants, including heavy metals and chlorinated compounds, affects the height and body mass index (BMI) of local communities. It found that some pollutants could be causing reduced height and BMI, which can be explained in part by the pollutants’ disrupting effects on the hormonal system.

People living in highly developed areas are exposed to a number of chemical pollutants introduced into the environment from traffic, industry and agriculture. Pollutants of concern include heavy metals (e.g. cadmium and lead) and various chlorinated compounds, such as polychlorobiphenyls (PCBs), hexachlorobenzene (HCB) and p,p′-dichlordiphenylchloroethylene (p,p′-DDE - a metabolite of the insecticide DDT).

During 2001 to 2006, a human biomonitoring programme was run to study the health effects from environmental pollution on a range of people living in Flanders, Belgium. In this study, researchers investigated whether the environmental exposure to certain pollutants had any impact on heights and BMI (a measure of weight in relation to height) for adolescents and adults who took part in the programme.

Urine and blood samples were taken from 1679 adolescents, 775 adult men and 808 adult women taking part in the study to screen for internal exposure to pollutants. In addition, the researchers recorded the height and body weight of the participants, established the sexual maturity of the adolescents and the participants completed questionnaires about health and personal lifestyle, including details of diet.

After allowing for differences in lifestyle and other personal factors, a number of associations between internal exposure to pollutants and effects on height and BMI were found. They found that heights and BMI tended to be lower as cadmium concentrations in urine increased for adolescents. For adults, higher levels of cadmium in urine corresponded with lower BMI. As urinary cadmium concentrations negatively affected sex hormones in adolescent boys, it is possible that the heights of boys could have been affected by changes in concentration of sex hormones. In addition, cadmium is known to affect growth hormones.

The BMI of adolescents was lower with increased levels of HCB and three types of PCB: 138, 153 and 180. However, higher levels of HCB in the blood were associated with increased heights of boys, possibly as a result of increased concentrations of sex hormones. Internal exposure to polycyclic aromatic hydrocarbons was associated with lower heights for boys.

Women with a higher internal exposure to lead tended to have a lower BMI, possibly through the toxicity and hormone disrupting effect of the lead. For both adolescents and adults, higher concentrations of PCB 118 in the blood indicated exposure to dioxin-like PCBs and were associated with greater BMI and height. Dioxin-like PCBs possibly have a growth stimulating effect, might induce differentiation in fat cells and anti-oestrogenic activity might also play a role in the observed effects. For adults, higher BMIs tended to correspond with higher levels of HCB, PCB 118 and p,p′-DDE. It was not possible to distinguish between current exposure to harmful chemicals and possible exposure to these chemicals years before.

The results of the study suggest that exposure to pollutants at levels actually found in the Flemish environment that result in “normal” internal exposures, could cause differences in height in adolescents and in BMI for both adolescents and adults. Organochlorines in particular, appeared to cause significant differences in BMIs.


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