

Abstract, presented at the International Society of Environmental Epidemiology conference, Utrecht 2019.

Associations between perfluoroalkyl substances and serum lipids in a Swedish adult population with contaminated drinking water

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Background

Exposures to perfluoroalkyl substances (PFAS) have shown positive associations with serum lipids in previous studies. While many studies on lipids investigated associations with perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), there are only a few studies regarding other PFAS, such as perfluorohexane sulfonic acid (PFHxS). The purpose of the current study is to investigate if associations with serum lipids were present, not only for serum PFOS and PFOA, but also for PFHxS, and if the associations with PFAS remained also in a comparison based only on residency in areas with contrasting exposure to PFAS.

Methods

1945 adults aged 20-60 were included from Ronneby, Sweden, a municipality where one out of two waterworks had been heavily contaminated from aqueous fire-fighting foams, and from a nearby control area. The exposure was categorized based on either been living in areas with contrasting PFAS exposure or based on the actual serum PFAS measurements. Regression analyses of serum lipids were fitted against serum PFAS levels, percentile groups, smooth splines and between exposed and reference areas, adjusting for age, sex and BMI.

Results

Drinking water contamination caused high serum levels of PFOS (median 157 ng/ml) and PFHxS (median 136 ng/ml) and PFOA (median 8.6 ng/ml). These serum PFAS levels in the exposed groups were 5 to 100-fold higher than in the controls. In this population with mixed PFAS exposure, predominantly PFOS and PFHxS, PFAS exposure were positively associated with serum lipids. This was observed both when quantifying exposure as contrast between exposed and controls, and in terms of serum PFAS. Due to high correlations between each PFAS, we cannot separate them.

Conclusions

In conclusion, the present study provides further evidence of a causal association between PFAS and serum lipids, especially for PFHxS.