

Organophosphate Flame Retardants in House Dust and their Association with School Children's Asthma and Allergies

Atsuko Araki, Hokkaido University Center for Environmental and Health Sciences, Sapporo, Japan

Yu Ait Bamai, Hokkaido University Center for Environmental and Health Sciences, Sapporo, Japan

Toshio Kawai, Kansai Occupational Health Technical Center, Osaka, Japan

Tazuru Tsuboi, Japan Industrial Safety and Health Association, Tokyo, Japan

Reiko Kishi, Hokkaido University Center for Environmental and Health Sciences, Sapporo, Japan

Background/Aim: Organophosphate flame retardants (PFRs) are used as additives as flame retardants and plasticizers, and are present in residential dust. We have reported the association between TCIPP and TDCIPP levels and prevalence of atopic dermatitis among inhabitants. There was no study examined the associations among children, who are more vulnerable to chemical exposure. In this study, we aimed to find association between PFRs and asthma and allergic symptoms among children,

Methods: Hundred and twenty-eight elementally school children in Sapporo participated this study. We visited children's home and dust samples were collected from multi-surface objects > 35 cm above the floor in 2009 and 2010. Eleven PFRs in dust were measured by GCMS. Wheeze, rhino-conjunctivitis and eczema were evaluated using ISAAC. The odds ratio (OR) of loge transformed dust concentration was calculated by logistic regression model, and adjusted for sex, grade, dampness index, annual house income, and parent history of allergy. Categorical model was also examined by quartile (detection frequency > 75%), tertile (detection frequency 50-75 %), and dictomatized (detection frequency <50%).

Results: Prevalence of wheeze, rhino-conjunctivitis, and eczema were 22.7%, 36.7%, and 28.1%, respectively. Among 11 PFR, TBOEP was the highest median concentration (detection % >LOD), 26.55 µg/g (95.3%), followed by TPhP 3.13 µg/g (94.4%). Detection percentage of TMP, TEP, TEHP and TCP were lower than 10% so that no further analysis was conducted. A significant associations between TDCIPP and eczema were found: OR (95%confidence interval) per loge unit was 1.44(1.13-1.82), and for > LOD (vs <LOD) was 3.92(1.37-11.21).

Conclusions: Similar to this study, TDCIPP showed significant association with increasing atopic dermatitis in our previous study conducted at 6 regions in Japan. The results of two different populations are in line, so that these association are likely to be true. On the other hands, cross-sectional study do not suggest the causal relationship, and relatively low detection percentage of TDCIPP in this study should be cautioned.