Pajanan Benzo(a)pyrene terhadap konsentrasi 1-Hydroxypyrene pada urin siswa Sekolah Dasar Negeri (SDN) di Sekitar Ruas Jalan Utama Jakarta Barat Tahun 2019 = Urinary 1-hydroxypyrene as a biomarker of benzo(a)pyrene exposure among school children in West Jakarta

Maisa Weli, author

Abstrak

Pendahuluan: Benzo(a)pyrene merupakan salah satu golongan PAH yangdiklasifikasikan sebagai senyawa yang bersifat karsinogen (probably carcinogenic)pada manusia dan hewan. Setelah terpajanan, benzo(a)pyrene yang masuk kedalamtubuh manusia melalui jalur inhalasi, langsung terabsorpsi didalam tubuh danterdistribusi dalam paru, kulit dan hati, lalu berikatan dengan DNA, RNA dan protein. Setelah memasuki tubuh manusia dan biotransformasi, Benzo(a)pyrene diekskresikan dalam bentuk metabolit terhidroksilasi dalam urin atau feses. 1-hydroxypyrene (1-OHP) dalam urin merupakan metabolit yang paling umum digunakan sebagai biomarker pajanan dari senyawa benzo(a)pyrene. Pengukuran konsentrasi benzo(a)pyrene dilakukan pada tiga titik di setiap sekolah menggunakan sorben tube dengan filter charcoal, dan dianalisis menggunakan metode fluoresensi. Analisis 1-hydroxypyrene dalam urin dilakukan menggunakan HPLC dengan detektor fluoresensi.
Tujuan: untuk melihat hubungan paparan benzo(a)pyrene terhadap konsentrasi 1-hydroxypyrene pada urin.
Metode: Penelitian ini merupakan penelitian kuantitatif dengan desain cross sectional, sampel dalam penelitian ini berjumlah 76 orang, pembagian sampel di buat secara probability proportional to size (PPS), pengambilan sampel menggunakan purposive sampling.
Hasil: Rata-rata konsentrasi BaP di udara indoor sekolah dasar negeri di sekitar ruas jalan utama Jakarta Barat sebesar 0,0059 mg/m3, dan rata-rata konsentrasi BaP di udara outdoor yaitu 0,0031 mg/m3. Rata-rata konsentrasi BaP di udara indoor pada sekolah terpajan tinggi yaitu 5,6 kali lebih tinggi (0,0102 mg/m3) di bandingkan sekolah yang terpajan terpajan rendah (0,0018 mg/m3). Rata-rata konsentrasi 1-OHP pada urin siswa sekolah dasar negeri di sekitar ruas jalan utama Jakarta Barat adalah 12,146 mol/mol kreatinin. Rata-rata konsentrasi 1-OHP pada urin siswa sekolah terpajan tinggi 1,2 kali lebih besar (13,363 mol/mol kreatinin) di bandingkan sekolah terpajan rendah (10,929 mol/mol kreatinin).
Kesimpulan: Hubungan pajanan BaP di udara indooor terhadap konsentrasi 1-OHP pada urin siswa berpola positif dimana terdapat korelasi positif antara pajanan BaP di udara indoor terhadap peningkatan konsentrasi 1-OHP pada urin siswa (r=0,229) artinya semakin tinggi pajanan BaP di udara indoor maka semakin tinggi konsentrasi 1-OHP pada urin siswa. Hasil uji statistik menjelaskan ada hubungan yang signifikan antara pajanan BaP di udara indoor dengan konsentrasi 1-OHP pada urin siswa (p=0,046).
.....
Introduction: Benzo(a)pyrene is a class of PAH which is classified as a carcinogenic compound (probably carcinogenic) in humans and animals. After exposure, benzo(a)pyrene which enters the human body through inhalation pathways, is directly absorbed in the body and distributed in the lungs, skin, and liver, then binds to DNA, RNA, and protein. After entering the human body and biotransformation, benzo(a)pyrene is excreted in the form of hydroxylated metabolites in urine or feces. 1-hydroxypyrene (1-OHP) in urine is the most common metabolite used as exposure biomarkers of benzo(a)pyrene compounds. Benzo(a)pyrene

concentration measurements were carried out at three points in each school using tube sorbents with charcoal filters and analyzed using the fluorescence method. Analysis of 1-hydroxypyrene in urine is carried out using HPLC with a fluorescence detector.
Objective: To see the relationship of exposure to benzo(a)pyrene to urine 1-hydroxypyrene concentration.
Method: This study is a quantitative study with a crosssectional design, the sample in this study amounted to 76 people, the sample distribution was made by probability proportional to size (PPS), the sampling used purposive sampling.
Results: The average BaP concentration in the indoor air of public elementary schools around the West Jakarta's main road segment is 0.0059 mg/m3, and the average BaP concentration in outdoor air is 0.0031 mg/m3. The average BaP concentration in indoor air in high exposed schools is 5.6 times higher (0.0102 mg/m3) compared to schools exposed to a low exposure (0.0018 mg/m3). The average 1-OHP concentration in the urine of public elementary school students around the West Jakarta main road segment is 12.146 mol/mol creatinine. The average concentration of 1-OHP in the urine of high-exposed school students was 1.2 times greater (13,363 mol/mol creatinine) compared to low-exposed schools (10,929 mol/mol creatinine).
Conclusion: The relationship of BaP exposure in indoor air to the concentration of 1-OHP in the urine of students was positively patterned where there was a positive correlation between BaP exposure in indoor air to an increase in 1-OHP concentration in the urine of students ($r = 0.229$) meaning higher exposure to indoor air the higher the concentration of 1-OHP in the urine of students. The results of the statistical test explained that there was a significant relationship between exposure to BaP in indoor air and the concentration of 1-OHP in the urine of students ($p = 0.046$).