

Hubungan antara kadar asam hipurat urin akibat pajanan toluen dengan efek kesehatan akut pada tenaga kerja percetakan "X"

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Abstrak

Toluen telah digunakan sebagai bahan pelarut di Percetakan "X". Bersamaan dengan itu pada tenaga kerja terjadi keluhan berupa mata berair, sesak nafas, batuk pilek, lelah, dan iritasi kulit. Di Percetakan "X", data mengenai kadar toluen di lingkungan kerja dan kadar asam hipurat urin sebagai indikator terpajannya tenaga kerja dengan toluen belum ada. Dengan demikian, perlu dilakukan penelitian mengenai kadar toluen di lingkungan kerja, besar nilai kadar asam hipurat urin dengan faktor-faktor risiko yang mempengaruhinya serta efek kesehatan akut yang di timbulkan.

Dalam penelitian ini digunakan studi potong lintang dengan memperhatikan perbedaan tingkat pajanan toluen di tempat kerja. Jumlah sampel yang diambil adalah total sampel berjumlah 135 orang, yaitu pada bagian printing 75 orang dan bagian gudang 60 orang. Data penelitian ini diperoleh berdasarkan observasi, status medis, kuesioner, wawancara, dan pemeriksaan kesehatan. Untuk kadar toluen di lingkungan kerja dianalisis dengan cara metoda 1510, Issue 2 dari NIOSH. Analisis deskriptif antara tenaga kerja di bagian printing dan gudang meliputi karakteristik subjek penelitian, kadar asam hipurat urin, dan efek kesehatan akut. Analisis regresi multipel dilakukan untuk melihat hubungan antara karakteristik subjek penelitian dengan kadar asam hipurat pulang kerja dan untuk melihat hubungan antara karakteristik subjek penelitian dengan peningkatan kadar asam hipurat urin. Sedangkan analisis regresi logistik dilakukan untuk melihat hubungan antara karakteristik subjek penelitian dengan efek kesehatan akut, dan hubungan antara kadar asam hipurat urin pulang kerja dengan efek kesehatan akut.

Kadar toluen di lingkungan kerja bagian printing berkisar antara 82 ppm sampai 120 ppm dengan Time Weighed Average (TWA) 90,05 ppm, sedangkan di bagian gudang berkisar antara 52 ppm sampai 67 ppm dengan TWA 50,48 ppm. Kadar rata-rata toluen di udara pada bagian printing dan gudang secara statistik berbeda bermakna ($p=0,000$), dan telah melampaui nilai ambang batas. Pada umumnya tidak terdapat perbedaan bermakna antara karakteristik subjek yang bekerja di bagian printing maupun gudang kecuali lama kerja ($p=0,01$) dan pendidikan ($p=0,012$). Untuk kadar asam hipurat urin awal waktu kerja dan pulang kerja, peningkatan kadar asam hipurat urin, dan efek kesehatan akut antara bagian printing dan gudang secara statistik berbeda bermakna ($p=0,000$). Hubungan antara karakteristik subjek penelitian dengan peningkatan kadar asam hipurat urin yang berkorelasi kuat yaitu faktor umur ($p=0,001$); lama kerja ($p=0,004$) dan kebiasaan merokok ($p=0,005$). Hubungan antara karakteristik subjek penelitian dengan peningkatan kadar asam hipurat urin pulang kerja yang berkorelasi kuat juga faktor umur ($p=0,005$); lama kerja ($p=0,000$) dan kebiasaan merokok ($p=0,001$), untuk lama kerja yang dihubungkan dengan nilai ($\hat{\Delta}$: -0,29) terlihat bahwa makin lama kerja, maka kadar asam hipurat urin pulang kerja semakin rendah.

Sedangkan risiko terjadinya efek kesehatan akut berdasarkan karakteristik subjek penelitian didapatkan

faktor umur (OR:2,55;CI:0,99-6,79), lama kerja (OR:1,84;CI:0,84-3,94) dan kebiasaan merokok (OR:18,7;CI:7,62-68,10). Risiko terjadinya efek kesehatan akut dengan kadar asam hipurat urin pulang kerja $\geq 0,99$ gr/L didapatkan secara statistik berbeda bermakna, dibandingkan dengan kelompok tenaga kerja dengan kadar asam hipurat urin pulang kerja $< 0,99$ gr/L (OR:7,6; CI:3,47-16,95). Gejala-gejala efek kesehatan akut yang ditimbulkan seperti : mata berair, sesak, lelah, reaksi kulit dan batuk.

Kesimpulan:

Kadar toluen di lingkungan kerja, baik di bagian printing maupun di bagian gudang Percetakan "X", di atas nilai ambang batas menurut Kep Menaker RI/1977 (NAB=50 ppm). Kadar asam hipurat urin yang didapat masih di bawah indeks biologis (1,6 gr/L). Karakteristik subjek penelitian yang berpengaruh pada bagian printing dan gudang adalah lama kerja dan pendidikan. Faktor- faktor yang mempengaruhi kinetik toluen di dalam tubuh adalah umur, lama kerja, dan kebiasaan merokok. Pengaruh efek kesehatan akut dengan kadar asam hipurat urin pada tenaga kerja terlihat berbeda bermakna antar kelompok pada titik potong (cut off point) 0,99 gr/L.

The Correlation between the Level of Hippuric Acid with the Acute Health Effect among the Workers Who Exposed By Toluene at the Printing Company "X" Jakarta 2002

Background:

Toluene has been used as a solvent in the printing company "x". According with it, many effects have been arisen such as: eye irritation, respiratory disfunction, cough, sore nose and throat, fatigue, skin irritation. Nevertheless in the printing company "x", the data about toluene exposure and biological monitoring indicator (hippuric acid) have not been available. As consequence, the printing company "x" studied to find the toluene exposure in the working area and determine the level of the hippuric acid in urine of workers, influencing factors and also acute health effects.

Methods:

The cross sectional study was used as an approach to look at the hippuric acid level in workers urine and its correlation with acute health effect. The total sample method was used to involve 135 people that consisted of 75 people in printing area and 60 people in ware house area. The data were collected by observation, medical record, questionnaire, interview, and physical examination. The level of toluene exposure was analyzed with NIOSH methods 1510, Issue 2. Descriptive analysis was applied to look at the printing department and the ware house department worker characteristics, the level of the hippuric acid and acute health effects. The multiple regressions was used to find the correlation between characteristic and the level of hippuric acid after shift and also to find the correlation between characteristic of workers and the increasing of the level of hippuric acid. In line with the analysis, the regression logistic analysis was used to find the correlation between the levels of hippuric acid after working with the acute health effect.

Result:

The range level of toluene in printing area 82 ppm - 120 ppm, with the time weighted average (TWA) was 90,05 ppm. In the ware house area the level of toluene were 52 ppm - 67 ppm, with the time weighted average (TWA) was 50,48 ppm. The mean of the exposure of toluene in printing department and ware house

department are statically significant different ($p=0,000$). In general, there was no difference in term of worker characteristics between the printing department and ware house department, except the job time length ($p=0,01$) and educational level of workers ($p=0,012$). Level of hippuric acid were statistically significant different between the printing department and the ware house department such as: before and after shift ($p=0,000$), the increasing of hippuric acid ($p=0,000$), and acute health effect ($p=0,000$).

The study found that the level of hippuric acid both before and after work, the increasing of hippuric acid during work, and acute health effects were statistically significant different ($p=0,000$) between those who work for the printing department with those who work for the ware house department. The level of after work hippuric acid has a strong correlation with age ($p=0,001$), job time length ($p=0,004$) and smoking habit ($p=0,005$). The correlation between job time length with hippuric acid level was $-0,29$. Meanwhile, workers who were ≥ 40 years old showed a 2,55 fold risk of acute health effect, (OR:2,55;CI: 0,99-6,79), who experienced < 60 month job time length had a 1,84 fold risk (OR: 1,84; CI: 0,84-3,94), and who had smoking habit had 18,7 fold risk of acute health effect (OR:18,7 ; CI: 7,62-68,10). Further more, workers whose their after work hippuric acid level $0,99$ gr/L showed a 7,6 fold risk of acute health effect. The symptom of the acute health effect included: eye irritations, respiratory distress, fatigue, cough and skin irritation.

Conclusion:

The level of toluene in the work place in the printing area and the ware house area at the printing "x" were higher than threshold limit value according to Kep. Menaker/ 1977 (TLV=50 ppm), and the increasing value of hippuric acid still below in the permissible biological index of hippuric acid in urin (TLV= 1,6 gr/L). The characteristics are consisted of significantly influence the increasing of hippuric acid as age, job time length, smoking habit, and IMT. Finally, the acute health effect in workers were found significant different between group of workers who have the hippuric acid level which its cut off point is $0,99$ gr/L.