Association between Air Pollutants and Levels of Macrophage Inflammatory Protein-2 in Purwokerto Informal Workers

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Abstract	Judul : Hubungan Pencemaran Udara dengan Kadar Protein Inflamasi Makrofag-2 pada Pekerja Informal PurwokertoLatar belakang: Tingkat polusi udara di Indonesia telah meningkat secara signifikan dalam dekade terakhir, yang sejalan dengan peningkatan insidensi gangguan pada sistem pernapasan, termasuk Penyakit Paru Obstruktif Kronik (PPOK). Deteksi dini gangguan sistem pernapasan akibat polusi udara menggunakan penanda biologis berpotensi mencegah keparahan penyakit meskipun masih diperlukan penelitian lebih lanjut. Penelitian ini bertujuan untuk Penelitian ini bertujuan menganalisis hubungan antara pajanan polutan udara dengan kadar Macrophage Inflammatory Protein-2 (MIP-2) pada pekerja sektor informal di Purwokerto, Kabupaten Banyumas, Provinsi Jawa Tengah.Metode: Studi belah lintang dilakukan pada 35 pekerja parkir luar ruang dan 35 pekerja informal dalam ruang di Purwokerto pada Maret 2021. Kadar particulate matter (PM) diukur menggunakan particle counter sebagai parameter tingkat polusi udara. Kadar. MIP-2 diukur dari sampel darah partisipan dengan menggunakan metode ELISA. Data dianalisis menggunakan Uji Mann-Whitney, Korelasi Spearman, dan analisis multivariat dengan Generalized Linear Model untuk mengevaluasi hubungan antara paparan polutan udara dan kadar MIP-2.Hasil: Kadar polutan udara di luar ruangan lebih tinggi dibandingkan di dalam ruangan (p=0,00), dan kadar MIP-2 lebih tinggi pada pekerja di luar ruangan dibandingkan pekerja di dalam ruangan (p=0,00). Kadar debu tidak berkorelasi dengan kadar MIP-2, baik pada pekerja di dalam ruangan (r=0,03; p=0,85), pekerja di luar ruangan (r=-0,31; p=0,07), maupun secara keseluruhan (r=0,20; p=0,09). Lama kerja total dan per hari juga tidak memiliki korelasi dengan kadar MIP-2 pada pekerja. Analisis multivariat menunjukkan tidak adanya hubungan antara durasi paparan dan kadar MIP-2 setelah dikendalikan oleh variabel usia dan kadar polusi udara.Simpulan:Ã‚Â Terdapat perbedaan signifikan antara kadar debu dan kadar MIP-2 di lokasi luar ruangan dibandingkan dengan dalam ruangan. Pajanan polutan udara, baik dari segi tingkat maupun durasi, secara konsisten tidak berkorelasi dengan kadar MIP-2 pada pekerja. Penelitian lebih lanjut diperlukan untuk memahami interaksi antara paparan polutan udara, kadar MIP-2, dan kondisi klinis gangguan pernapasan yang disebabkan oleh polusi udara.Ã‚Â ABSTRACTBackground: Air pollution level has significantly increased in Indonesia followed by the increase in respirational disorders such as Chronic Obstructive Pulmonary Disease (COPD) in the last decade. Early detection of air pollution-related respiratory disorders using biological markers potentially reduces the severity of these diseases, but further studies are still required. This research seeks to evaluate the relationship between exposure to air pollutants and Macrophage Inflammatory Protein-2 (MIP-2) levels among informal workers in Purwokerto, Banyumas District, Central Java Province. Method:Ã‚Â A cross-sectional study was carried out in March 2021 involving 35 informal outdoor workers and 35 indoor workers in Purwokerto. Particulate matter (PM) concentration was assessed using a particle counter, serving as an indicator of air pollution level. MIP-2 serum level was measured from participants' blood samples using the ELISA method. The Mann-Whitney test, Spearman correlation test, and multivariate analysis using the Generalized Linear Model were employed to assess the relationship between air pollutant exposure and MIP-2 serum levels.Result: The levels of air pollution (p=0.00) and MIP-2 serum (p=0.00) were significantly elevated in outdoor environments compared to indoor environment. Ã‚Â Exposure to air pollutants did not show a significant correlation with MIP-2 serum levels in outdoor workers (r=-0.31; p=0.07), indoor workers (r=0.03; p=0.85), or overall (r=0.20; p=0.09). The overall and daily working duration did not show a correlation with the MIP-2 serum levels in the workers. Multivariate analysis indicated that there was no association between the duration of exposure and MIP-2 levels when adjusted for age and air pollution level.Conclusions: Ã‚Â There were notable differences in air pollutant levels and MIP-2 serum levels between indoor and outdoor environments. Air pollutant exposure, both in duration and level, consistently did not correlate with the MIP-2 serum level of workers. Further studies are required to understand the interactions among air pollutant exposure, MIP-2 serum level, and clinical conditions of air pollution-related respiratory disorders.

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