

ABSTRAK

Latar belakang: Penyakit Paru Obstruktif Kronik (PPOK) merupakan salah satu masalah kesehatan di Indonesia dan dihubungkan salah satunya dengan pajanan polutan udara. Pajanan polutan udara yang melebihi Nilai Ambang Batas (NAB) dapat mengakibatkan inflamasi paru yang ditandai dengan pelepasan mediator proinflamasi seperti *Macrophage Inflammatory Protein-2* (MIP-2). Penelitian ini bertujuan untuk mengetahui hubungan antara pajanan polutan udara dengan kadar MIP-2 pada pekerja informal di Purwokerto.

Metode: Penelitian ini merupakan studi observasional dengan pendekatan *cross-sectional* yang merekrut 35 pekerja parkir *outdoor* sebagai subjek penelitian dan 35 pekerja informal *indoor* sebagai pembanding secara konsekutif. MIP-2 diukur dari sampel darah subjek penelitian dan diperiksa dengan metode ELISA. Kadar debu berupa PM_{2.5} dan PM₁₀ diukur menggunakan alat *particle counter*. Data penelitian dikumpulkan dengan wawancara pada subjek penelitian menggunakan kuesioner. Uji korelasi *Spearman* dan analisis multivariat *Generalized Linear Model* digunakan untuk menguji hubungan antara pajanan debu dengan kadar MIP-2, uji *Mann-Whitney* digunakan untuk menguji perbedaan antara kadar debu dan kadar MIP-2 *outdoor* dan *indoor*.

Hasil: Hasil penelitian menunjukkan bahwa tidak terdapat hubungan antara pajanan kadar debu dengan kadar MIP-2 baik di *outdoor* ($r=0,03$; $p=0,85$), *indoor* ($r=-0,31$; $p=0,07$), maupun secara total ($r=0,20$; $p=0,09$). Pajanan polutan udara di *outdoor* lebih tinggi dibandingkan dengan di *indoor* ($p=0,00$). Kadar MIP-2 pada pekerja *outdoor* lebih tinggi dibandingkan dengan pekerja *indoor* ($p=0,00$). Lama kerja secara keseluruhan dan per hari tidak berhubungan dengan kadar MIP baik pada pekerja *outdoor*, *indoor*, maupun total. Analisis multivariat menunjukkan tidak adanya hubungan antara lama pajanan dengan kadar MIP-2 ketika variabel usia, pajanan debu, dan merokok dikendalikan.

Kesimpulan: Pajanan polutan udara berupa kadar debu secara konsisten tidak berhubungan dengan kadar MIP-2 pekerja informal di Purwokerto. Meskipun demikian terdapat perbedaan kadar debu dan kadar MIP-2 yang bermakna antara pekerja *outdoor* dibandingkan dengan pekerja *indoor*. Kadar debu lokasi *outdoor* lebih tinggi untuk itu penggunaan APD berupa masker pada pekerja di *outdoor* sangat penting.

Kata Kunci: Pajanan Polutan Udara, *Particulate Matter*, Lama Pajanan, *Macrophage Inflammatory Protein-2* (MIP-2), Pekerja Informal

ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is one of major health problems in Indonesia and has been associated with exposure to air pollutants. Exposure to air pollutants that exceed the threshold value may cause lung inflammation which is characterized by the release of pro-inflammatory mediators such as Macrophage Inflammatory Protein-2 (MIP-2). This study aimed to determine the association between air pollutant exposure and MIP-2 levels in informal workers in Purwokerto.

Methods: This was a cross-sectional study that consecutively recruited 35 outdoor parking workers as study subjects and 35 indoor informal workers as comparison subjects. MIP-2 was measured from blood samples of study subjects and examined by ELISA method. Dust levels in the form of PM_{2.5} and PM₁₀ were measured using a particle counter. Other study data were collected by interviewing the subjects using a questionnaire. Spearman correlation test and multivariate analysis of Generalized Linear Model were used to examine the association between dust exposure and MIP-2 levels, Mann-Whitney test was used to test the difference between outdoor and indoor dust exposure and MIP-2 levels.

Results: The results from this study showed that there was no association between exposure to dust levels and MIP-2 levels both in outdoor ($r=0.03$; $p=0.85$), indoor ($r=-0.31$; $p=0.07$), as well as in total ($r=0.20$; $p=0.09$). Exposure to air pollutants in outdoor was higher than indoor ($p=0.00$). MIP-2 levels in outdoor workers were higher than indoor workers ($p=0.00$). Working duration in overall and per day were not associated to MIP levels for both outdoor and indoor, as well as for total workers. Multivariate analysis showed that there was no association between exposure duration and MIP-2 levels when adjusted to age, dust exposure, and smoking status.

Conclusion: Exposure to air pollutants to informal workers in Purwokerto, in the form of dust levels is consistently not associated with their MIP-2. However, significant differences were found in dust exposure and MIP-2 levels between outdoor workers compared to indoor workers. The dust content of outdoor locations is higher, therefore the use of personal protective equipment in the form of masks for outdoor workers is very important.

Keywords: Air Pollutants Exposure, Particulate Matter, Exposure Duration, Macrophage Inflammatory Protein-2 (MIP-2), Informal Workers