

**HUBUNGAN PAJANAN POLUTAN UDARA DENGAN KADAR  
*Krebs von den Lungen-6 (KL-6)* PADA PEKERJA *OUTDOOR* DAN *INDOOR*  
DI PURWOKERTO**

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**ABSTRAK**

**Latar belakang:** Indonesia menempati urutan ke-8 dunia dalam tingkat polusi udara yang sebagian besar disebabkan oleh emisi gas buang dari kendaraan bermotor. Polusi udara dikaitkan dengan terjadinya kematian dini dan terutama disebabkan oleh gangguan fungsi jaringan interstitial paru yang kronik dan progresif seperti fibrosis paru idiopatik. Penanda biologis seperti *Krebs von den Lungen-6 (KL-6)* berpotensi digunakan untuk deteksi dini penyakit paru akibat polusi udara, tetapi hubungan antara pajanan polutan udara dan kadar KL-6 masih belum banyak diteliti.

**Tujuan:** Menganalisis hubungan antara pajanan polutan udara dengan kadar KL-6 pada pekerja *outdoor* dibandingkan dengan pekerja *indoor*.

**Metode:** Penelitian ini merupakan penelitian *cross sectional* yang merekrut secara konsekutif 35 pekerja *outdoor* dan 35 pekerja *indoor* sebagai kelompok pembanding. Pajanan polutan udara diukur dalam bentuk kadar debu menggunakan alat *particle counter*. Kadar KL-6 diukur dari sampel darah vena dengan pemeriksaan ELISA tipe *sandwich*. Uji korelasi *Spearman rank* dan uji beda *Mann Whitney* digunakan untuk menganalisis hubungan antara pajanan debu udara dengan kadar KL-6. Analisis multivariat *Generalized Linear Model* digunakan untuk menguji hubungan pajanan debu udara dengan kadar KL-6 dengan mengendalikan faktor usia dan kadar debu.

**Hasil:** Terdapat hubungan signifikan dan berkorelasi negatif antara konsentrasi polutan pekerja *outdoor* ( $r = -.557, p < 0.05$ ) dan pekerja *indoor* ( $r = -.360, p < 0.05$ ). Tidak ditemukan hubungan antara lama kerja dan KL-6 dan tidak ditemukan adanya hubungan antara durasi kerja per hari dengan kadar KL-6 dengan nilai  $p > 0.05$ . Terdapat perbedaan bermakna konsentrasi polutan udara lokasi *outdoor* dibandingkan lokasi *indoor* dengan nilai ( $p < 0.05$ ). Terdapat perbedaan bermakna kadar KL-6 pada kelompok pekerja *outdoor* dibandingkan kelompok pekerja *indoor* ( $p < 0.05$ ).

**Kesimpulan:** Ditemukan adanya hubungan antara pajanan debu udara dengan kadar KL-6 pada pekerja *outdoor* dan *indoor* namun berkorelasi negatif. Meskipun demikian, terdapat perbedaan yang bermakna dalam kadar debu udara dan kadar KL-6 antara pekerja *outdoor* dengan pekerja *indoor*. Penelitian lebih lanjut dengan pengukuran yang lebih teliti dan kompleks dibutuhkan untuk mengkonfirmasi hasil penelitian ini.

**Kata Kunci:** *Krebs von den Lungen 6 (KL-6)*, Polutan Udara, Pekerja *Outdoor* dan *Indoor*

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**ASSOCIATION BETWEEN AIR POLLUTANTS EXPOSURE WITH THE LEVEL  
OF Krebs von den Lungen-6 (KL-6) IN THE OUTDOOR AND INDOOR WORKERS IN  
PURWOKERTO**

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**Background:** Indonesia ranks 8th in the world in terms of air pollution, which is mostly caused by emissions from motor vehicles. Air pollution is associated with premature death and is mainly caused by chronic and progressive impairment of lung interstitial tissue such as idiopathic pulmonary fibrosis. Biological markers such as Krebs von den Lungen-6 (KL-6) have the potential to be used for early detection of lung disease due to air pollution. However, the association between air pollutant exposure and KL-6 levels has not been widely studied.

**Objective:** To analyze the association between exposure to air pollutants and KL-6 levels in outdoor workers compared to indoor workers.

**Methods:** This study is a cross-sectional study that consecutively recruits 35 outdoor workers and 35 indoor workers as a comparison group. Air pollutant exposure was measured in terms of dust level using a particle counter. KL-6 levels were measured from venous blood samples by sandwich type ELISA examination. Spearman rank correlation test and Mann-Whitney test were used to analyze the association between air dust exposure and KL-6 levels. Generalized Linear Model multivariate analysis was used to examine the association between air dust exposure and KL-6 levels adjusted to age and dust levels.

**Results:** There is a significant and negative correlation between pollutant concentrations of outdoor workers ( $r = -.557$ ,  $p < 0.05$ ) and indoor workers ( $r = -.360$ ,  $p < 0.05$ ). There was no relationship between length of work and KL-6 and no relationship was found between duration of work per day and levels of KL-6 with  $p > 0.05$ . There is a significant difference in the concentration of air pollutants in outdoor locations compared to indoor locations with a value ( $p < 0.05$ ). There was a significant difference between the group of outdoor workers compared to the group of indoor workers on the level of KL-6 ( $p < 0.05$ ).

**Conclusion:** There was association between air dust exposure and KL-6 levels in outdoor and indoor workers but negatively correlated. However, there was a significant difference in air dust levels and KL-6 levels between workers and indoor workers. Further studies with more precise and complex measurements are needed to confirm the results of this study.

**Keywords:** Krebs von den Lungen 6 (KL-6), Air Pollutant, Outdoor and Indoor Workers

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