Peran 25 (OH)D Terhadap Aktivitas Plasma Renin dan Plasma Aldosteron pada Pekerja Terpajan Timbel = The Correlation between Blood Lead Level, 25(OH)D, Plasma Renin Activity, and Plasma Aldosterone among Indonesian Male Workers

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Abstrak

Latar belakang:
Penelitian sebelumnya menunjukkan bahwa kemungkinan mekanisme pengaruh pajanan timbel terhadap tekanan darah dan penyakit ginjal kronis adalah melalui Sistem Renin-Angiotensin-Aldosteron (RAAS). Aktivitas Plasma Renin (PRA) dan Plasma Aldosteron merupakan dapat digunakan sebagai penanda dini untuk gangguan ginjal awal akibat pajanan timbel. Penelitian juga menunjukkan bahwa vitamin D sebagai antioksidan memiliki peran penting dalam aksis RAAS dan dalam mencegah stres oksidatif akibat pajanan timbel. Penelitian ini bertujuan untuk menganalisis korelasi antara pajanan timbel, 25(OH)D, dan Renin-Aldosteron pada pekerja.
Metode
Dalam penelitian cross-sectional ini, kami menyelidiki korelasi antara kadar timbel dalam darah (BLL), 25(OH)D, PRA, dan Aldosteron pada pekerja laki-laki di empat lokasi yang diketahui terpajan timbel sebelumnya atau saat ini pada area kegiatan daur ulang baterai asam timbel di Jawa, Indonesia. Penelitian ini dilakukan dari bulan Mei hingga Juli 2023.
Hasil
BLL ditemukan pada semua subjek, dengan nilai terkecil 1,17 ug/dL dan terbesar 58,83 ug/dL. Kami menemukan BLL berkorelasi positif dengan kadar 25(OH)D (r = 0,206, p = 0,043) dan rasio renin aldosteron (r = 0,203, p = 0,046), serta berkorelasi negatif dengan PRA (r = -0,266, p = 0,009). Kami juga menemukan rasio BLL-25(OH)D berkorelasi negatif dengan PRA (r= -0,256, p=0,011)
Kesimpulan
Penelitian ini menemukan bahwa median BLL di antara para pekerja lebih tinggi dari yang direkomendasikan BEI.
Terdapat korelasi positif antara BLL dan kadar 25(OH)D, hasil penelitian ini menunjukkan bahwa pajanan timbel dengan vitamin D bergantung pada dosis dan hubungan antara keduanya saling berinteraksi satu sama lain. BLL dan PRA ditemukan signifikan namun berkorelasi negatif. BLL dan aldosteron tidak signifikan dan tidak berkorelasi. BLL memiliki korelasi positif dengan rasio aldosteron-renin. BLL dapat menyebabkan hiperaldosteronisme relatif.
.....Background:
Previous studies showed that a possible mechanism effect of lead exposure on blood pressure and chronic kidney disease is through the Renin-Angiotensin-Aldosterone System (RAAS) axis. Plasma Renin Activity (PRA) and Plasma Aldosterone are the possible markers of early renal disorders due to lead exposure. Studies also showed that Vitamin D as an antioxidant has a vital role in the RAAS axis and in preventing oxidative stress due to pollutant exposure. This study aimed to analyze the correlation between lead exposure, 25(OH)D, and Renin-Aldosterone in workers' settings.

Method
In this cross-sectional study, we investigated the correlation between blood lead level (BLL), 25 (OH)D, PRA, and Aldosterone among male workers in four locations with known previous or present exposure to lead in lead acid battery recycling activity areas in Java, Indonesia. The study was conducted from May to July 2023.
Result
BLL were found in all subjects, with the smallest value of 1.17 ug/dL and the largest of 58.83 ug/dL. We found BLL a positive correlation with 25(OH)D levels (r=0,206, p=0,043) and aldosterone renin-ratio (r=0.203, p=0.046), and a negative correlation with PRA (r= -0.266, p=0.009). We also found BLL-25(OH)D ratio a negative correlation with PRA(r=-0.256, p=0.011)
Conclusion
This study found that the median BLL among the workers was higher than the recommended BEI.
There is a positive correlation between BLL and 25(OH)D levels, the results of this study indicate that lead exposure to vitamin D is dose-dependent and the relationship between them is interacting with each other. BLL and PRA were found to be significant but negatively correlated. BLL and aldosterone were not significant and not correlated. BLL have a positive correlation with the aldosterone-renin ratio. BLL may cause relative hyperaldosteronism.