

RELATION BETWEEN NICKEL EXPOSURE IN OCCUPATIONAL ENVIRONMENT TO SUPEROXIDE DISMUTASE (SOD) ACTIVITY IN DENTAL TECHNICIAN

ABSTRACT

Background: Dental technicians use a base alloy containing a mixture of metals to produce a dental prosthesis, which is nickel. At the time of the manufacturing process, metal dust can enter the body of the technique through inhalation, skin, and digestion. Nickel acts as a catalyst in the formation of Reactive Oxygen Species (ROS). Increased ROS causes oxidative stress. The body has an enzyme as a natural defense system in the form of endogenous enzymes one of them Superoxide Dismutase (SOD). The SOD enzyme is the first line of defense against the radical toxicity of superoxide anions and helps neutralize superoxide reactions. SOD participates in cell signaling through ROS settings. **Purpose:** This research was conducted to see the correlation of nickel metal exposure with Superoxide Dismutase (SOD) activity in dental technique at Surabaya Laboratory. **Methods:** Cross-Sectional studies on 40 dental techniques and 30 controls after ethical clearance were approved (No: 149/HRECC.FODM/VIII/2017). Blood sampling for examination of nickel metal content by Atomic Absorption Spectrophotometric (AAS) method and test of SOD enzyme activity level with Assay Method. **Result:** Nickel metal content (70.19 ± 41.86) in the dental technique was higher than the control, the SOD enzyme (13.68 ± 14.77) in the technique was lower than the control. Nickel values and SOD enzyme activity were 6.60 ± 5.96 and 72.73 ± 10.54 , respectively. Spearman's correlation test showed a negative correlation between exposure to nickel metals and SOD enzyme activity (Sig: $0.00 < 0.05$ and $r -0.732$). Different tests on Nickel and SOD metals between dental and control techniques showed significant values (Sig: $0.00 < 0.05$). **Conclusion:** There is a correlation between exposure of Nickel metal with SOD Enzyme Activity The higher the exposure of Nickel metal then the decreasing of SOD.

Keywords: Nickel, Superoxide Dismutase, ROS

HUBUNGAN PAPARAN LOGAM NIKEL (Ni) DI LINGKUNGAN KERJA TERHADAP AKTIVITAS ENZIM *SUPEROXIDE DISMUTASE (SOD) PADA TEKNIKER GIGI*

ABSTRAK

Latar Belakang: Tekniker gigi menggunakan paduan dasar yang mengandung campuran logam untuk menghasilkan protesa gigi, salah satunya nikel. Pada saat proses pembuatan, debu logam bisa masuk ke tubuh tehnik melalui inhalasi, kulit, dan pencernaan. Nikel berperan sebagai katalisator dalam pembentukan Reactive Oxygen Species (ROS). Peningkatan ROS menyebabkan stres oksidatif. Tubuh memiliki enzim sebagai sistem pertahanan alami berupa enzim endogen salah satunya *Superoxide Dismutase (SOD)*. Enzim SOD ialah garis pertahanan pertama dalam melawan toksisitas radikal anion superoksida dan membantu menetralkan reaksi superoksida. SOD berpartisipasi dalam pensinyalan sel melalui pengaturan ROS. **Tujuan:** Penelitian ini dilakukan untuk melihat hubungan paparan logam nikel dengan aktivitas *Superoxide Dismutase (SOD)* pada tekniker gigi di Laboratorium Surabaya. **Metode:** Studi *Cross-Sectional* pada 40 tekniker gigi dan 30 kontrol setelah izin etik disetujui (Nomor: 149/HRECC.FODM/VIII/2017). Pengambilan sampel darah untuk pemeriksaan kadar logam nikel dengan metode Spektrofotometri Serapan Atom (AAS) dan uji kadar aktivitas enzim SOD dengan Metode Assay. **Hasil:** Kadar logam nikel ($70,19 \pm 41,86$) pada tekniker gigi lebih tinggi dari kontrol, enzim SOD ($13,68 \pm 14,77$) pada tekniker lebih rendah daripada kontrol. Nilai Nikel dan aktivitas enzim SOD masing-masing adalah $6,60 \pm 5,96$ dan $72,73 \pm 10,54$. Uji korelasi *Spearman* menunjukkan korelasi negatif antara terpapar logam nikel dan Aktivitas enzim SOD (Sig: 0,00 <0,05 dan $r - 0,732$). Uji beda pada logam Nikel dan SOD antara tekniker gigi dengan kontrol menunjukkan nilai signifikan (Sig: 0,00 <0,05). **Kesimpulan:** Terdapat hubungan antara paparan logam Nikel dengan Aktivitas Enzim SOD Semakin tinggi paparan logam Nikel maka semakin turun Kadar SOD.

Kata Kunci : Nikel, *Superoxide Dismutase*, ROS