

ABSTRAK

Latar Belakang: Saat ini ada kebutuhan mendesak untuk memeriksa secara dekat potensi perubahan patologis yang terjadi pada operator yang terpapar radiasi pengion secara kronis untuk meningkatkan tingkat perlindungan radiasi dan kesadaran akan risiko radiasi. Pengaruh radiasi pengion pada manusia berupa kerusakan DNA oksidatif dapat dilihat dengan menilai konsentrasi 8-OHDG.

Tujuan: Mengetahui kadar 8-hydroxy-20-deoxyguanosine (8-OHDG) urin sebagai biomarker yang sensitif terhadap kerusakan DNA seluler akibat radiasi pada operator radiasi dan pasien kateterisasi.

Desain & Metode Penelitian: Penelitian ini menggunakan desain potong lintang. Pasien dengan penyakit jantung yang membutuhkan kateterisasi jantung didaftarkan, dengan orang sehat sebagai kontrol, serta operator lab cath dan operator radiasi lain RS Dr. Sardjito-Yogyakarta. Demografi, kebiasaan, status gizi, klinis, laboratorium dan data hemodinamik invasif, tingkat 8-OHDG urin, dan pengukuran paparan radiasi dikumpulkan secara prospektif.

Hasil: 25 pasien dan 25 orang sehat dipelajari. Di antara 25 pasien yang menjalani kateterisasi jantung, kadar 8-OHDG urin yang diperoleh pada 24 jam setelah prosedur (0,895 ng/mL) secara signifikan lebih tinggi ($P = 0,000$) dibandingkan pada awal (0,428 ng/mL). Selanjutnya, kadar 8OHdG urin setelah prosedur meningkat pada 23 dari 25 subjek penelitian. Sebaliknya, tidak ada perbedaan yang signifikan dalam kadar 8-OHDG antara 2 sampel urin spot yang diperoleh pada interval reguler 24 jam pada 25 orang sehat ($P = 0,981$). Untuk operator, 28 operator lab cath, 19 operator radioterapi dan 17 operator X-ray diagnostik dipelajari. Kadar 8-OHDG urin yang diperoleh pada morning spot secara signifikan lebih tinggi ($P = 0,007$) pada operator cath lab (0,434 ng/mL) dibandingkan operator rontgen diagnostik (0,178 ng/mL) dan operator radioterapi (0,150 ng/mL).

Kesimpulan: Pada pasien yang menjalani kateterisasi jantung dan operator yang bekerja dengan prosedur ionisasi medis, 8-OHDG urin mungkin menjadi biomarker yang berguna untuk kerusakan DNA seluler akibat radiasi.

ABSTRACT

Background: Today there is an urgent need to closely examine potential pathological changes occurring in operators chronically exposed to ionizing radiation to increase the radiation protection level and awareness of radiation risk. The effect of ionizing radiation on humans in the form of oxidative DNA damage can be seen by assessing the concentration of 8-OHdG.

Objective: To determine the level of urinary 8-hydroxy-20-deoxyguanosine (8-OHdG) as a sensitive biomarker for radiation-induced cellular DNA damage in radiation operators and catheterization patients.

Study design & Methods: This study used cross-sectional design. Patients with heart conditions who needed cardiac catheterization were enrolled, with healthy people as controls, as well as cath lab operators and other radiation operators of Dr. Sardjito Hospital-Yogyakarta. Demographic, habits, nutritional status, clinical, laboratory and invasive hemodynamic data, urinary 8-OHdG levels, and radiation exposure measurements were collected prospectively.

Results: 25 patients and 25 healthy individuals were studied. Among the 25 patients who underwent cardiac catheterization, the level of urinary 8-OHdG obtained at 24h after procedure (0.895 ng/mL) was significantly higher ($P = 0.000$) than at baseline (0.428 ng/mL). Furthermore, the urinary 8OHdG level after the procedure increased in 23 of the 25 study subjects. In contrast, there was no significant difference in 8-OHdG levels between the 2 spot urine samples obtained at regular interval of 24 h in 25 healthy individuals ($P = 0.981$). For operators, 28 cath lab operators, 19 radiotherapy operators and 17 diagnostic X-ray operators were studied. The level of urinary 8-OHdG obtained at morning spot was significantly higher ($P = 0.007$) for cath lab operators (0.434 ng/mL) than diagnostic X-ray operators (0.178 ng/mL) and radiotherapy operators (0.150 ng/mL).

Conclusions: In patients undergoing cardiac catheterization and operators who work with medical ionizing procedures, urinary 8-OHdG may be a useful biomarker for radiation-induced cellular DNA damage.