CORRELATION BETWEEN SCATTERED-RADIATION DOSES TO THE EYES OF ANGIOGRAPHIC STAFF AT DIFFERENT HEIGHTS: A PHANTOM STUDY

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ABSTRACT

The scattered-radiations that reached the eye lens of angiographic staff can cause radiation-induced cataract. This preliminary study aimed to find the correlation between scattered-radiation doses and heights which correspond to the eyes of angiographic staff at different positions in an angiography room. An anthropomorphic upper body phantom (Kyoto Kagaku PBU-31) which simulated a male patient was exposed in a posteroanterior projection (PA) using the Siemen's Artis Q angiographic system. The phantom was exposed for 22 seconds in Digital Subtraction Angiography (DSA) acquisition with the technical factors for a percutaneous transhepatic biliary drainage (PTBD) procedure. The scattered-radiation doses were measured using the nanodot optically stimulated luminescence (OSL) dosimeters (Landauer, Inc., Glenwood, USA). A total of 96 nanodots were placed on twelve paper tubes which simulated twelve different positions in the angiography room. Three lines of four paper tubes each were placed at the side of examination table. The first line was 40cm from isocentre of exposure, and the second and third line was 0.3048 meter and 0.6096 meter away from the first line. On each paper tube, eight nanodots were placed to measure the scattered-radiation doses at eight different heights of 135, 140, 145, 150, 155, 160, 165 and 170 cm from the floor. Scattered-radiation doses recorded by the nanodots were read in the mGy units using the InLight microStar reader. Spearman's rank order correlation was used as the radiation doses were not normally distributed. For overall scattered-radiation doses, the Spearman correlation showed that there is moderate inverse correlation between eye levels and scattered-radiation doses, $r = -0.478$ (p-value < 0.001). This preliminary study found that scattered-radiation doses inversely correlated with the height of angiographic staff eyes especially when positioned near the patient.

Keywords: Scattered-radiation, Eye Level Dose, Interventional Angiography

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