ABSTRACT

This study introduces a method to measure phantom tilt and use it as a correction to improve the accuracy of gantry-tilt estimation on axial CT images of a cylindrical phantom. Scans were acquired on a GE Revolution EVO CT scanner using a GE phantom. Gantry-tilt settings were varied from 0° to 30°, with phantom-tilt settings of 0° and 5°. Phantom tilt was derived from shifts in the centroid coordinates of phantom images acquired at two distinct positions along the z-axis, whereas gantry tilt was estimated from the ratio between the lateral (LAT) and anteroposterior (AP) diameters. The correction was implemented by subtracting the measured phantom-tilt angle from the measured gantry-tilt angle. Analyses included paired t-tests, linear regression, and comparison against a gantry-angle tolerance threshold of ≤3°. The measured phantom tilt deviated by <1.5° from the nominal setting. Applying the phantom-tilt correction substantially improved gantry-tilt accuracy: the mean difference between measured and nominal gantry angles decreased from 3.46° (without correction) to 0.87° (with correction) for the 5° phantom-tilt configuration. The proposed correction effectively enhances the accuracy of gantry-tilt measurements on axial CT images and is applicable to cylindrical phantoms used in quality control.

Keywords: gantry tilt, phantom tilt, computed tomography, quality control.