Evaluation of Standard Liver Volume in Adult Thai Population Using CT Volumetric Measurement

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Abstract

Objective: 1) to assess the various existing formulas and the simple, diameter-base equation for calculation of standard liver volume (SLV) in a Thai population, using CT volumetric measurement (CTV) as gold standard. 2) to develop a new formula for calculation of SLV in a Thai population.

Material and Method: Liver volume of 117 patients who underwent abdominal MDCT for various indications was measured, using CTV. Correlation between CTV and calculated liver volume, acquired from the simple, diameter-base equation and six previously reported formulas, were analyzed. The new formula correlating body weight (BW) or body surface area (BSA) to the measured liver volume from CTV were established using regression analysis.

Results: All existing formulas offer fair to moderate agreement with the measured liver volume from CTV with intra-class correlation (ICC) ranging from 0.280 to 0.576. BW was found to correlate with the measured liver volume from CTV more closely than BSA, then the new formula based on BW was constructed; 21.127 x BW (kg). However, our new formula still has only moderate agreement with measured liver volume from CTV (ICC = 0.598). Liver volume calculated from simple, diameter-base equation offer very strong agreement with the measured liver volume from CTV (ICC = 0.829).

Conclusion: All formulas based on BW and BSA offer only fair to moderate agreement with measured liver volume CTV, which can lead to high degree error in liver volume estimation. The present study supports that liver volume can be more accurately estimated on CT scan using simple, diameter-based equation. This simple, reproducible method can be used as a good alternative for liver volume calculation. It is particularly useful in case where there is no Digital Imaging and Communications in Medicine (DICOM) data or dedicated 3D software with volumetric measurement application available.

Keywords: Standard liver volume, CT volumetry, CT volumetric measurement

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