# Indexing of left atrial volume by body surface area and height in a Brazilian population without previous heart disease and with a normal heart on echocardiography. Behavior in obese and overweight patients.

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## Abstract

Background: Left atrial (LA) volume indexing for body surface area (BSA) may underestimate LA size in obese and overweight people. Since LA volume is a risk marker for some cardiovascular events, it is suggested that indexing for height would be an alternative more apropriated method. The aims of this study were to find normal and the best cutoff values for LA volume indexed for height in our population. Methods: Echocardiograms from 2018 to 2021 were reviewed and patients without known cardiac disease and completely normal echocardiograms that had the left atrial volume (LAvol) measured by biplane Simpson's method were included. LAvol was indexed by BSA (ml/m$^2$), by height (LAvol/m), by height raised to exponent 2.7 (ml/ m2.7) and by height squared (ml/h$^2$). Results: A total of 545 patients, 50.5 ± 13.4 y., 335 females (61,5%) were analyzed. There were 145 normal weight (26.6%), 215 overweight (39.4%), 154 obese (28.3%) and 31 low weight (5.7%) patients. To estabilish normal values we included only the normal weight group and considered normal values from 2SD below to 2SD above the mean. Mean and normal values were: LAvol/h 26.0 ±4.5, 17 – 30 ml/m, LAvol/ht$^2$ 16 ± 2.8, 10.4 - 21.6 ml/ ht$^2$ and LAvol/ht2.7 11.4 ± 2.2, 7.0 - 15.8 ml/m2.7. The normal LAvol/ht2.7 differed between male and female (11.4 ± 2.4 and 12.8 ± 2.6, p = 0.000). LA diameter, LAvol, LAvol/h, LAvol/h$^2$ and LAvol/ht2.7 increased progressively from low-weight, normal weight, overweight and obese patients (p= 0.0000), but not LAvol/BSA. When indexing LAvol for height, for height$^2$ and for height2.7 20.8%, 22.7% and 21.4% of the obese patients, respectively, were reclassified as enlarged LA, and 7.4%, 8.8% and 8.4% of the overweight patients as well. Using ROC curve analysis, LAvol/h$^2$ had the highest AUC ant the best predictive value to identify LA enlargement and LAvol/BSA the worst one. Conclusions: normal values for LAvol indexed for height by three different methods are described in normal individuals. We reinforce that LAvol indexation for BSA underestimates LA size in obese and overweight patients and in these groups, specially, indexing for height$^2$ is probably the best method to evaluate LAvol.

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