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Prevalence of Left Ventricular Hypertrophy in Obese Population and its Correlation with Body Mass Index: A Retrospective Echocardiographic Study

Girish Raj, Ahmad Syadi Mahmood Zuhdi

Faculty of Medicine, University Malaya, Kuala Lumpur

Corresponding Author email: girishraj1988@gmail.com

Introduction:

Obesity is an increasingly prevalent public health problem and is independently associated with adverse cardiovascular remodelling. Left ventricular hypertrophy (LVH), a key marker of cardiovascular morbidity and mortality, has been observed in obese individuals even in the absence of traditional comorbidities. However, data on the prevalence of LVH and its relationship with body mass index (BMI) in Southeast Asian populations remain limited, and conventional left ventricular mass index (LVMI) indexing methods may underestimate LVH in obese population.

Aim:

To determine the prevalence of LVH in obese population and to evaluate the correlation between BMI and LVMI using retrospective echocardiographic data from a Malaysian cohort.

Methods:

This was a retrospective cross-sectional study conducted at University Malaya Medical Centre involving adult population attending obesity, obstructive sleep apnoea, and cardiology clinics between 2023 and 2025. Of 273 records screened, 157 subjects met inclusion criteria. Obesity was classified according to Malaysian Clinical Practice Guidelines. Standard two-dimensional guided M-mode echocardiography was used to calculate left ventricular mass using the Devereux-modified ASE formula. LVH was defined using ASE/EACVI LVMI cut-offs, with Southeast Asian-adjusted thresholds considered for interpretation. Correlation and multivariate regression analyses were performed to identify determinants of LVMI.

Results:

The mean BMI of the cohort was 39.5 ± 7.2 kg/m². LVH was present in 45.9% of subjects using ASE criteria and 51.0% using Southeast Asian cut-offs. LVH prevalence increased across obesity classes from overweight to Class II obesity, with a decline observed in Class III obesity. BMI showed a positive correlation with absolute left ventricular mass and left atrial dimension but not with indexed LVMI. Male sex and increasing age were independent predictors of higher LVMI. Notably, 31.3% of subjects without hypertension or diabetes still demonstrated LVH.

Conclusion:

LVH is highly prevalent among obese population in this Malaysian cohort, including those without cardiometabolic comorbidities. Although BMI was not an independent predictor of LVMI after indexation, obesity was associated with significant structural cardiac changes. These findings highlight obesity as an independent driver of cardiac remodelling and support the use of echocardiography for early cardiovascular risk stratification in obese individuals.