Arterial stiffness could reflect increased cardiac load and reduced pulmonary function in the general population

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Background: Pulmonary function is known to decrease with age and reduced pulmonary function has been reported to be associated with all-cause mortality and cardiovascular death. The association between pulmonary impairment and atherosclerosis was reported previously but has not been investigated sufficiently in the general population.

Purpose: We hypothesized that arterial stiffness could reflect increase of cardiac load and reduced pulmonary function. The present study aimed to investigate whether increased cardiac load and reduced pulmonary function could affect arterial stiffness in the general population.

Methods: Subjects undergoing their health check-up were enrolled. Plasma B-type natriuretic peptide (BNP) levels and serum high-sensitivity cardiac troponin I (hs-cTnI) levels were measured to evaluate cardiac load and myocardial damage. Radial augmentation index (rAI) was measured to investigate arterial stiffness using HEM-9000AI device. Subjects with an ST-T segment abnormality on the electrocardiogram, renal insufficiency, cancer, active inflammatory disease, or a history of cardiovascular events and pulmonary disease were excluded. Pulmonary function was assessed using spirometry by calculating forced vital capacity (FVC) as a percentage of predicted value (FVC%-predicted), forced expiratory volume in 1 second (FEV1) as a percentage of predicted value (FEV1%-predicted), and the ratio of FEV1 to FVC (FEV1/FVC).

Results: A total of 1100 subjects aged 57 years were enrolled and their median values of BNP and hs-cTnI were 15.5 and 2.3 pg/ml. The levels of rAI were significantly associated with the levels of BNP after adjustment for possible confounders in multivariate regression analysis, but were not with the levels of hs-TnI. While the parameters of pulmonary function were inversely associated with the levels of rAI and hs-cTnI after adjustment for possible confounders in the multivariate regression analysis, but not with the levels of BNP. The other multivariate regression analyses where BNP, hs-cTnI, parameters of pulmonary function, and the other possible factors were simultaneously included as independent variables revealed that the BNP levels and the FVC%-predicted or FEV1%-predicted, besides age, gender, smoking status, body mass index, blood pressure, heart rate, creatinine, fasting plasma glucose, and triglyceride, were significantly associated with the levels of rAI.

Conclusions: The significant associations of rAI with BNP and pulmonary function were revealed in the general population. These findings support that arterial stiffness could reflect increased cardiac load and reduced pulmonary function, in apparently healthy individuals.