

Title: **Novel arterial stiffness index was associated with pulmonary function**

Introduction

Recent studies have shown that the results of vascular function tests, such as pulse wave velocity or cardio-ankle vascular index (CAVI), were associated with pulmonary function in children or hypertensive patients, and increased CAVI might be correlated with progression of chronic obstructive pulmonary disease. However, the association between vascular function and pulmonary function remains unclear, especially in healthy adult people. Arterial velocity pulse index (AVI) is a novel arterial stiffness index that can be measured more easily than previous methods. The aim of this study was to investigate the association between AVI and pulmonary function test results in the healthy adult population.

Methods

We conducted a cross-sectional survey of healthy adults aged 20 years or older at a single large medical center in Hachinohe, Japan between April 2014 and March 2015. We measured AVI using cuff oscillometry. AVI means the characteristics of pulse waves at higher cuff pressure than systolic BP. The outcome measure was forced expiratory volume in one second (FEV1), which was measured with spirometry. We used log-transformed values of AVI and FEV1, as the distributions of these values were skewed. We calculated a correlation coefficient between AVI and FEV1, and performed multiple linear regression analyses to adjust for effects of age, sex, height, and smoking status.

Results

In total, 777 men and 530 women participated in this study. The mean age of total participants was 44.9 years (SD = 5.9), and the percentage of current smokers was 32.0 % (418 out of 1,307). The mean AVI was 15.6 (SD = 4.9), and the mean FEV1 was 3.13 L (SD = 0.65). AVI was negatively correlated with FEV1 ($r = -0.21$, $p < 0.001$). In fully-adjusted models, AVI was independently associated with FEV1 ($\beta = -0.03$, $p = 0.017$, 95 % CI = -0.06 to -0.01).

Conclusions

Our study showed that an increase of arterial stiffness as assessed via AVI was independently associated with a decrease in FEV1 in the healthy Japanese population. Further study is warranted to confirm these findings in cohort studies.

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Introduction

Recent studies have shown that the results of vascular function tests, such as pulse wave velocity, augmentation index, or cardio-ankle vascular index (CAVI), were associated with pulmonary function in children or hypertensive patients, and increased CAVI might be correlated with progression of chronic obstructive pulmonary disease.^{1,2}

However, the association between vascular function and pulmonary function remains unclear, especially in healthy adult people.

Arterial velocity pulse index (AVI) is a novel arterial stiffness index that can be measured more easily than previous methods.³

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In fully-adjusted models, AVI was independently associated with FEV1 ($\beta = -0.03$, $p = 0.017$, 95 % CI = -0.06 to -0.01).

Table 1. Baseline characteristics of participants

No. of participants	1307
Male	777 [59.4]
Age (years)	44.9 ± 5.9
Height (cm)	166.1 ± 8.2
Current smoker	418 [32.0]
AVI	15.6 ± 4.9
FEV1 (L)	3.1 ± 0.7

Data are means ± SD or n [%].

Figure. Correlation between AVI and FEV1

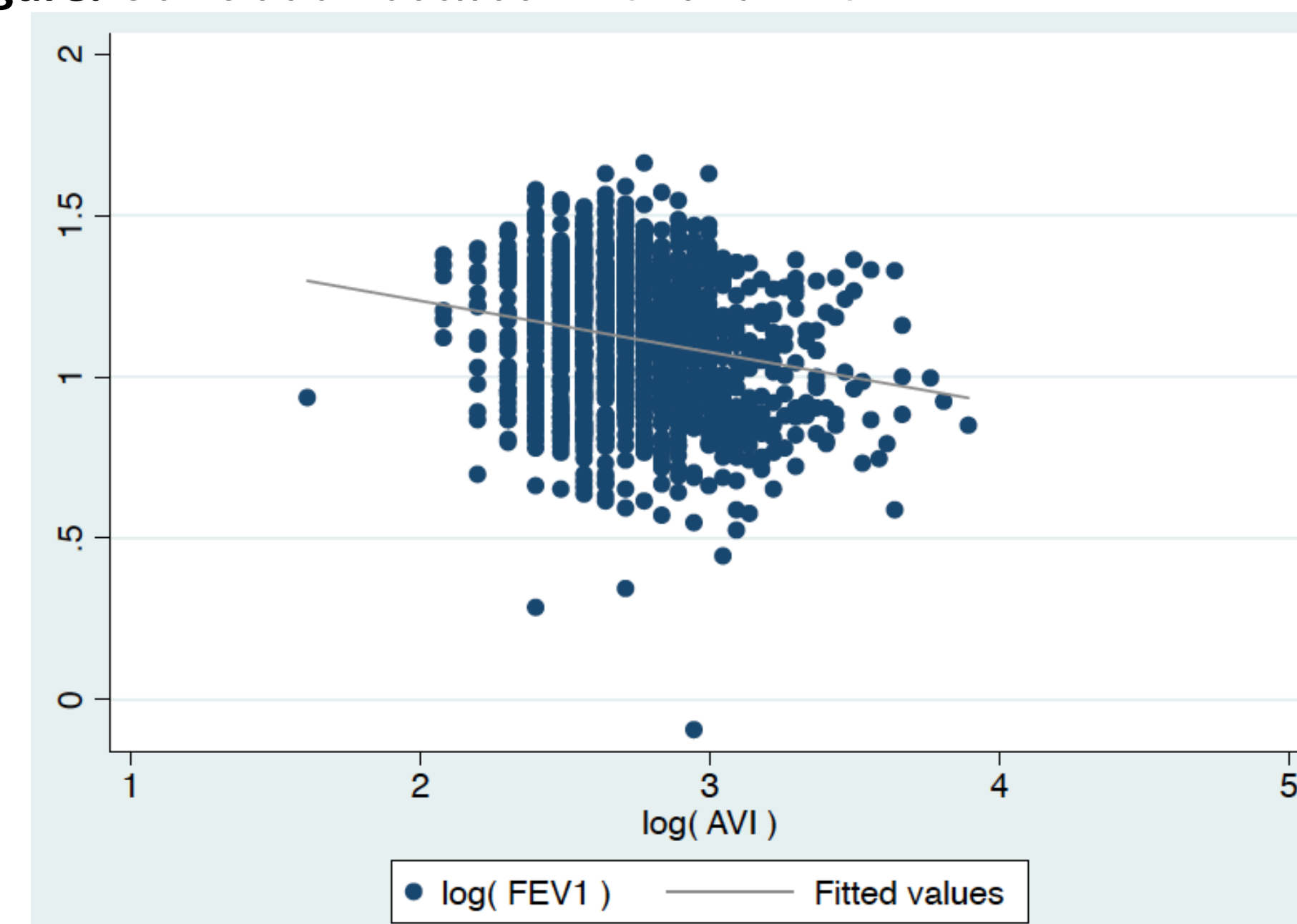


Table 2. Correlations coefficients of log(FEV1)

in multiple linear regression analyses

	Coef.	P value	95% C.I.
Log (AVI)	-0.033	0.017	-0.061, -0.006
Male	0.211	< 0.001	0.190, 0.232
Age			
- 44 (reference)	-	-	-
45 - 54	-0.044	< 0.001	-0.059, -0.029
55 - 64	-0.185	< 0.001	-0.219, -0.152
65 -	-0.191	< 0.001	-0.246, -0.135
Height			
- 159 (reference)	-	-	-
160 - 169	0.101	< 0.001	0.080, 0.122
170 - 179	0.178	< 0.001	0.151, 0.205
180 -	0.288	< 0.001	0.246, 0.329
Current smoker	-0.027	0.001	-0.043, -0.012

Adjusted R-squared = 0.64

Conclusions

Our study showed that an increase of arterial stiffness as assessed via AVI was independently associated with a decrease in FEV1 in the healthy Japanese population.

Further study is warranted to confirm these findings in cohort studies.

Competing Interests

The authors have declared that no competing interests exist.

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