

Evaluation of the respiratory airway impedance in patients with OSA

In awake status

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【Background】

The pathophysiology of obstructive sleep apnea (OSA) is related to the narrowness of upper airway. The forced oscillation technique (FOT) is a non-invasive method to evaluate the resistance and reactance in respiratory functions.

【Aims and Objectives】

The aim of this study was to assess the relationship between the airway impedance and severity of OSA in awake status.

【Methods】

We examined the respiratory impedance in 35 patients with OSA in awake status in the positions of sitting, supine, and left lateral recumbent using FOT instrument (MostGraph-01@ (CHEST M.I., Tokyo, Japan). All the patients had normal function in spirometry.

We measured Apnea-Hypopnea Index(AHI) in total night, AHI in the supine position during sleep time(supine-AHI), cumulative time spent with arterial O₂ saturation below 90% (CT90), and lowest SpO₂(minSpO₂)at night, by polysomnography(PSG).

【Results】

Table 1) The characteristics of subjects (mean±SD)

n(m,f) 35 (27,8)
Age(year) 61±11 (32-82)
BMI(kg/m²) 26.82±4.56
FVC(L) 3.40±0.76
%FVC(%) 95.64±10.79
FEV₁(L) 2.70±0.61
%FEV₁(%) 92.28±11.89
FEV₁/FVC(%) 79.48±5.43

mild SAS(5≤AHI<15) 8
moderate SAS(15≤AHI<30) 13
severe SAS(30≤AHI) 14
AHI(/h) 29.46±19.82
supine-AHI(/h) 40.58±23.63
CT90(%) 10.60±16.98
Lowest SpO₂ 81.00±5.05

Fig 1) FOT data in each position

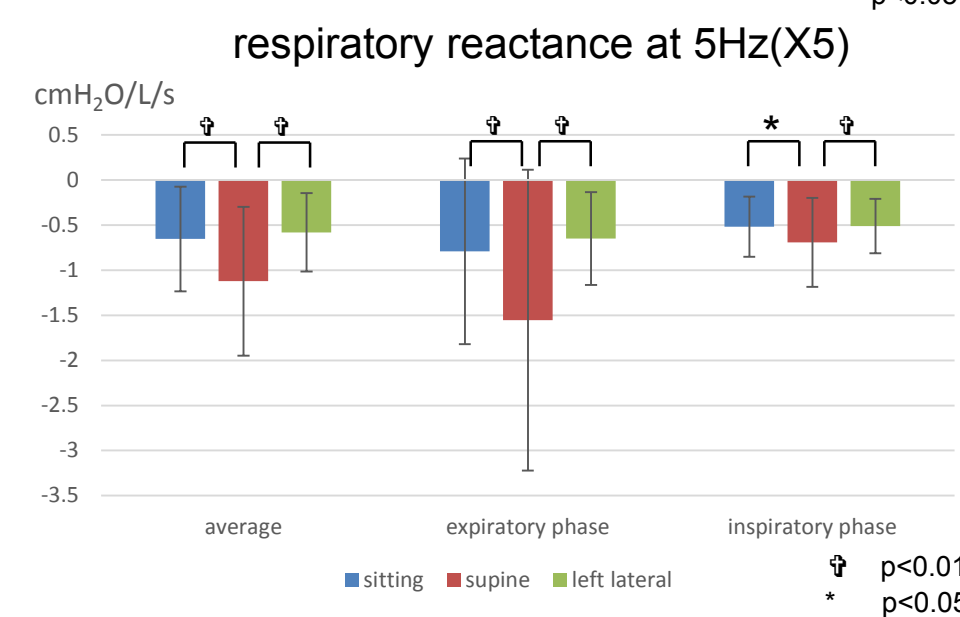
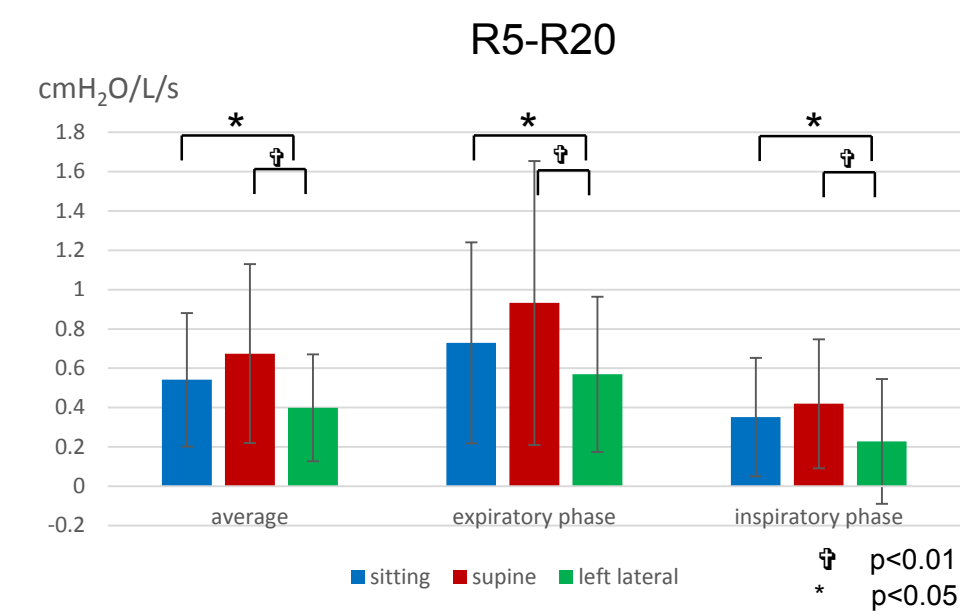
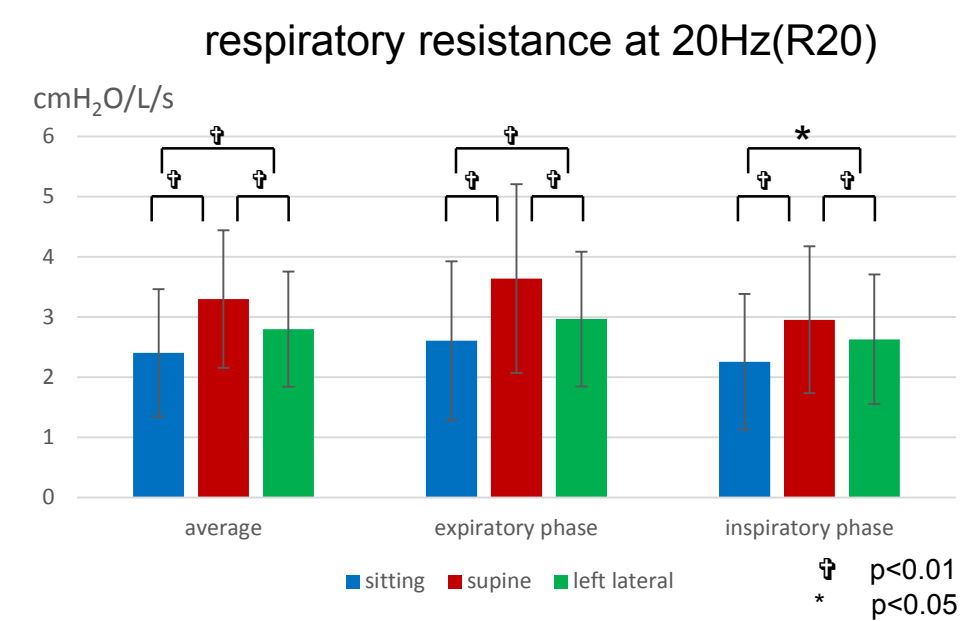
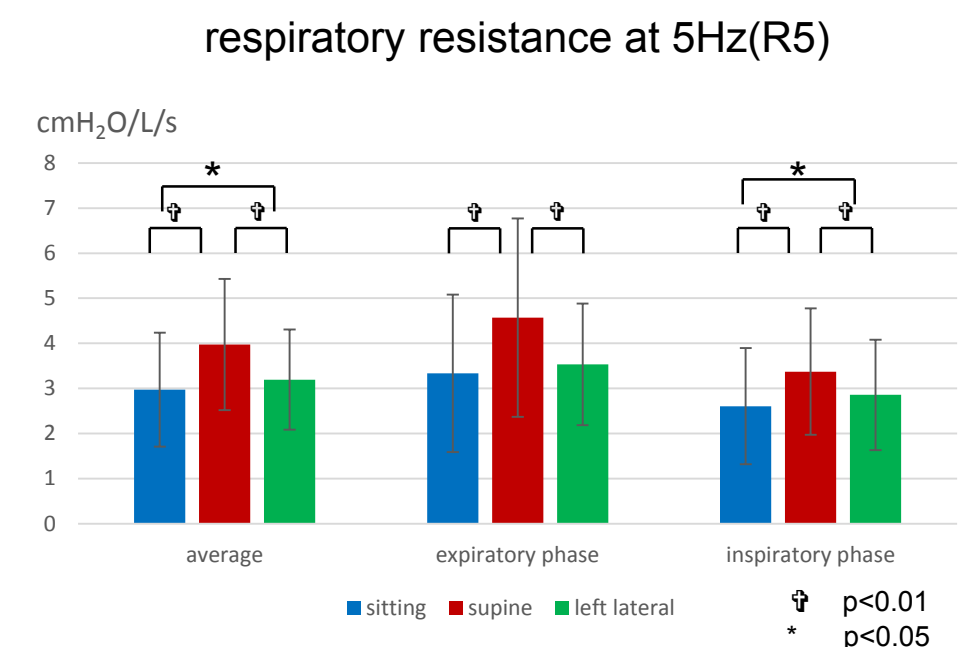


Fig 2) Relationship between AHI and R5, R20 in the sitting position.

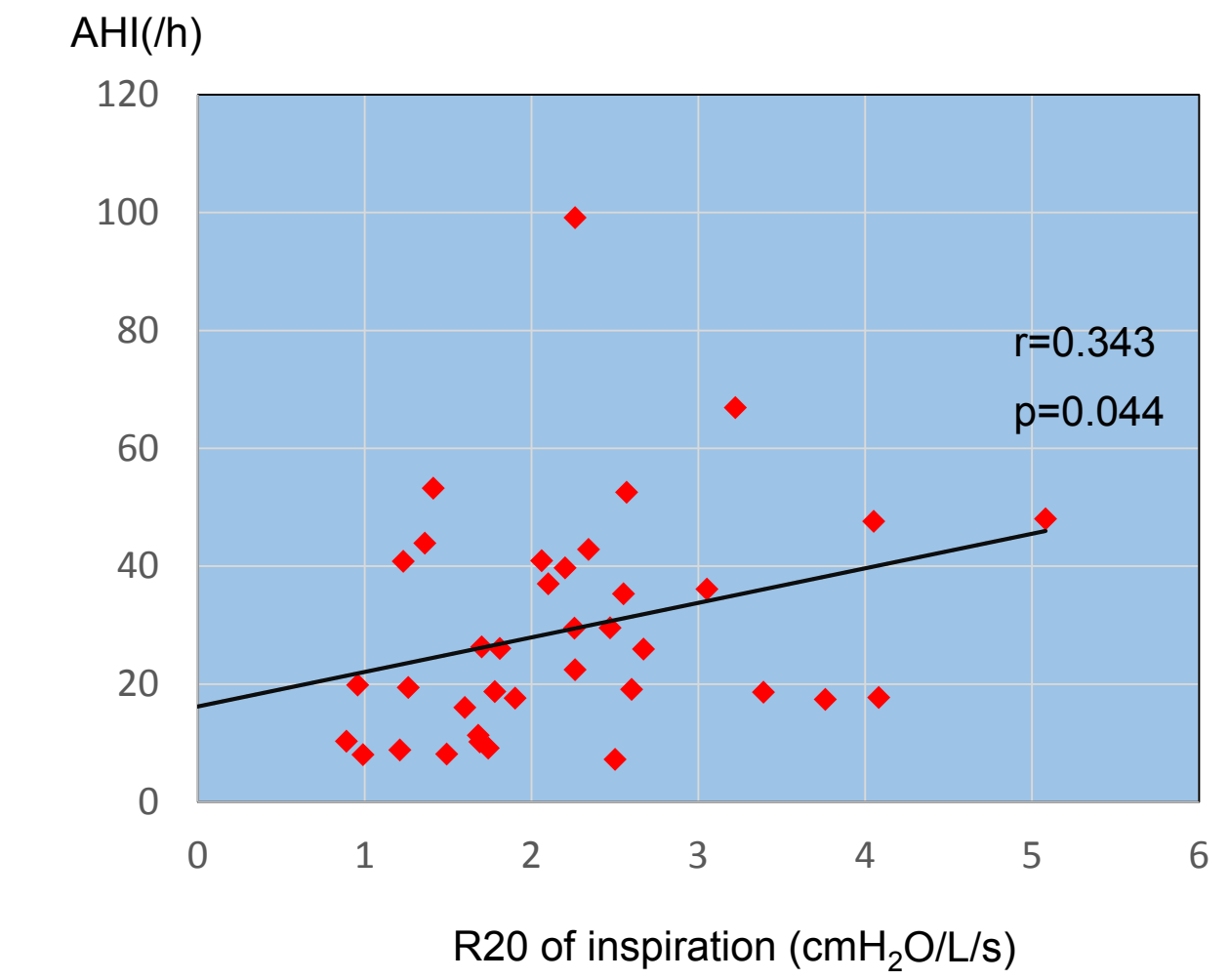
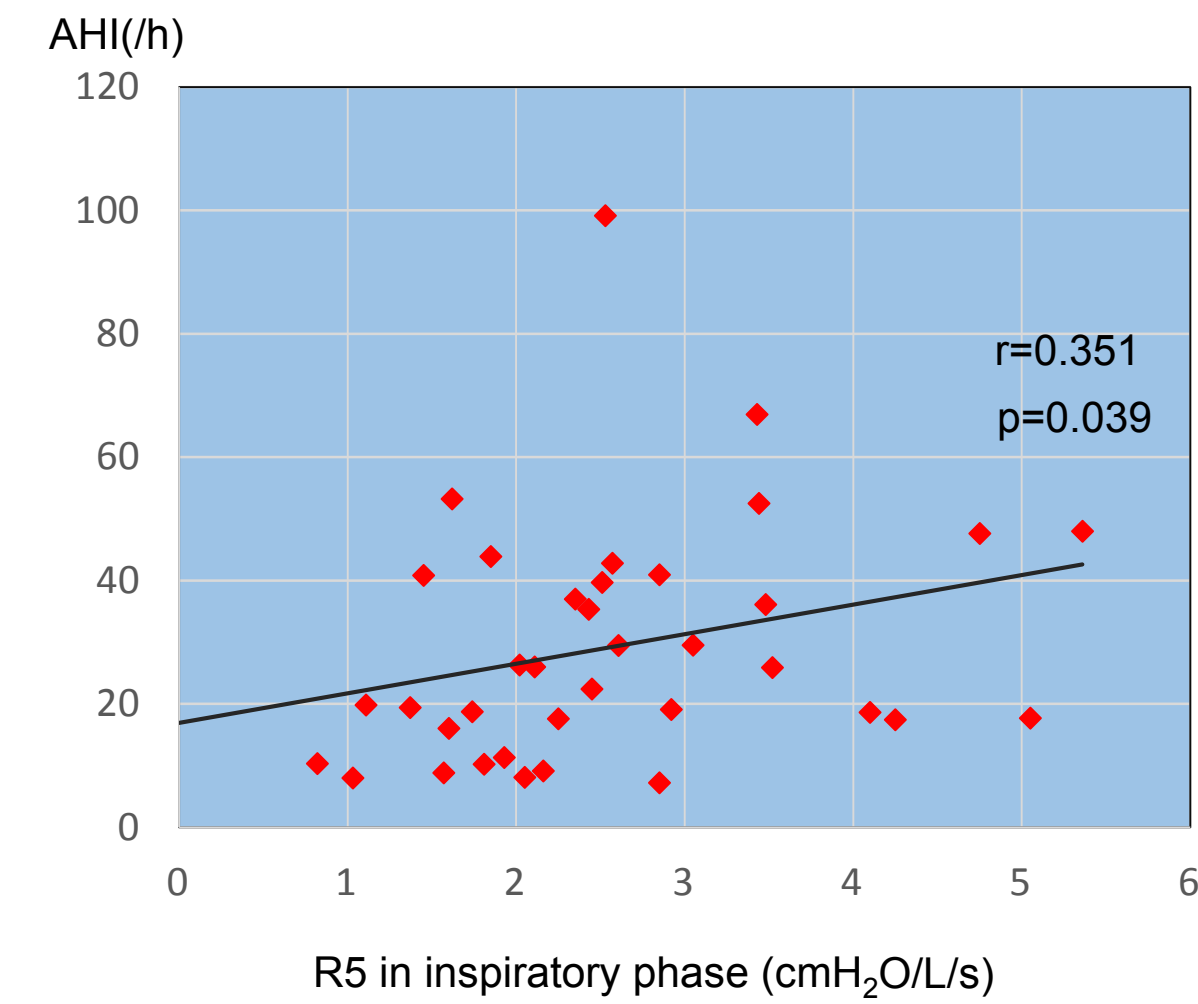
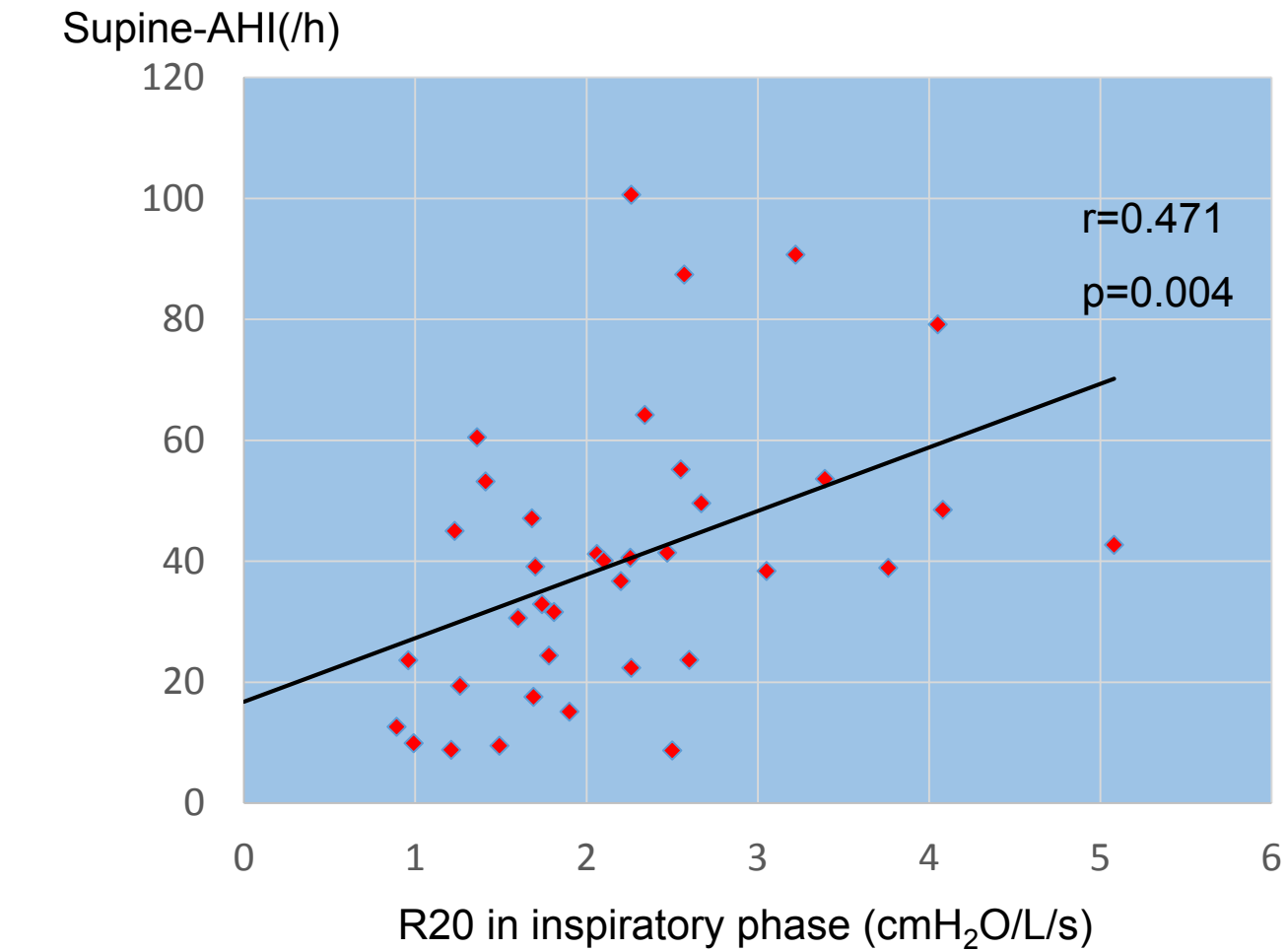
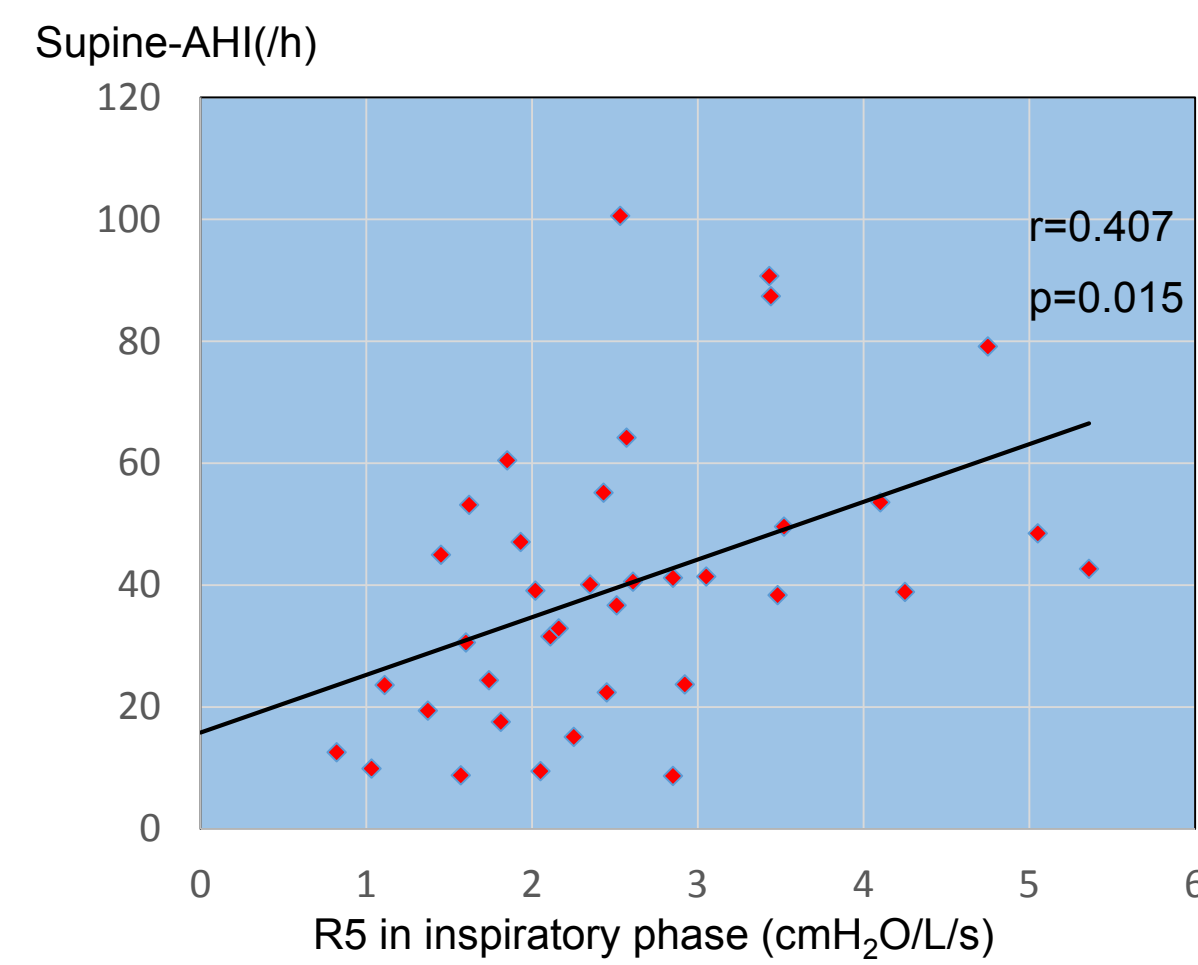


Fig 3) Relationship between supine-AHI and R5, R20 in the sitting position.



【Discussion】

- AHI is the index of OSA severity. The present study showed that the AHI was significantly correlated with R5 and R20 in inspiratory phase in the sitting position. The correlation of the respiratory resistance with AHI in awake status may indicate that the OSA is related to the narrowness of upper airway in inspiration phase.
- In addition, the supine-AHI were significantly correlated with R5 and R20 in the positions of sitting, supine, and left lateral recumbent, which suggested that the sleep apnea in OSA in the supine position might be further strongly affected by the narrowness of upper airway in awake status.

【Conclusion】

The respiratory resistance examined by FOT showed a significant correlation with AHI. FOT might be a useful technique to estimate the severity of OSA.