Salt Sensitivity and Elevated Plasma Aldosterone/Renin Ratio Are Additive Risk Factors for Cardiovascular Diseases

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Abstract

Background: We recently found that increased plasma aldosterone/renin ratio (ARR) is associated with future cardiovascular (CV) events. We investigated the interrelationship between salt sensitivity of blood pressure (SS) and ARR in Japanese patients with essential hypertension (EH).

Methods: We conducted a prospective cohort study. The cohort consisted of 96 EH patients whose ARR and SS were determined in a hospitalized condition. SS was defined as elevation of mean blood pressure > 10 mmHg after switching dietary NaCl from 3g to 20g/day for 1 week. Patients were divided into 4 groups by five-tenths percentile of ARR (SS) and the presence of SS. The incidence of CV events were observed for 14 years in average.

Results: The numbers of patients classified as high ARR/SS (n=17), high ARR/non-SS (n=31), low ARR/SS (n=18), and low ARR/non-SS (n=30), respectively. The mean ARR values were significantly higher in SS than in non-SS patients (109±16 vs. 77±19, p<0.05). The morbidity of fatal and non-fatal CV events were high in a order of high ARR/SS, high ARR/non-SS, low ARR/SS, and low ARR/non-SS. Conclusions: SS and high ARR are additive risk factor for CV disease.

To investigate the interrelationship between SS and ARR in Japanese essential hypertensives

Subjects & Methods

The original study cohort consisted of 173 hypertensive patients who agreed to participate to the dietary Salt-balance Studies conducted in our hospital during 1984-93.

**Washing Out**

Regular salt (10g NaCl/day) for one week

High salt (20g NaCl/day) for one week

The inclusion criteria was having systolic pressure > 160 mmHg and/or diastolic pressure > 90 mmHg, except for the presence of severe end-organ damage or CV complications. Anti-hypertensive agents were discontinued at least 2 weeks before admission.

133 Hypertension patients agreed to participate in dietary salt-balance studies
Anti-hypertensive agents discontinued at least 2 weeks before admission

Placed on 10g NaCl diet for one week after blood pressure evaluation

Switching dietary NaCl to 20g/day

PRA (ng/ml)/Hct (0.5ml): Hematocrit, and Clinical evaluation about SS

ARR was calculated

96 Patients were divided into four groups and followed up for 14 years

Cardiovascular (CV) events include myocardial infarction, angina pectoris, stroke, aortic aneurysm/disssection, or end-stage renal disease.

**Summary**

In Japan, the morbidity of stroke among hypertensive population with systolic/diastolic blood pressure of 140-180/90-110 mmHg is approximately 2.3-100 person/year, which is consistent with the value observed in the entire cohort of present study. However, the high ARR group had 2.7-fold higher incidence of stroke than in the low group while the incidence of other CV events were comparable. Such an observation is consistent with previous reports that the incidence of stroke was higher in patients with aldosteronism than in those with EH. In summary, we demonstrated that elevated ARR is associated with increased incidence of CV disease in Japanese patients with EH in a long-term observation analysis. There has been limited information about a prognostic value of the measurement for RAAS. The results of our present observation suggest that simple measurement of PRA and PAC may be of help to select potentially severe case and the choice of treatment regime.

**Conclusions**

SS and high ARR are additive risk factor for CV disease in patients with essential hypertension.

**References**

2. Ikeda CG, Webster RB. Mineralocorticoid excess, dietary sodium, and myocardial fibrosis. J Lab Clin Med. 1992;120:893-901