CARDIAC DIMENSIONS ARE LARGELY DETERMINED BY DIETARY SALT IN PATIENTS WITH PRIMARY ALDOSTERONISM. RESULTS OF A CASE CONTROL STUDY


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• Primary aldosteronism has been recognized as a common cause of hypertension, with a possibly prevalent prevalence of 5-10% among general hypertensives.
  

• Aldosterone, in addition to blood pressure, contributes directly to target-organ damage by inducing inflammation and fibrosis.

BACKGROUND

Aldosterone + 1% NaCl

Score for myocardial necrosis

Aldosterone + 0.3% NaCl

Immunohistochemical staining with markers for heart fibrosis

ALDOSTERONE

SALT

TARGET-ORGAN DETERIORATION

OBJECTIVES

Investigate and compare the relationships between (1) aldosterone and (2) dietary salt and LV dimensions in patients with primary aldosteronism.

1. Subjects with confirmed PA (n=21) and controls (n=21) matched for age, gender, duration of hypertension and 24h SBP/DBP.

2. All patients were prospectively evaluated with 24 h ABPM, transthoracic echocardiography and biochemical studies.
METHODS

• Diagnosis of PA

1. ≥2 elevated plasma aldosterone/renin ratios off interfering Rx.
2. Positive fludrocortisone suppression test.
   • Four days administration of a high-sodium diet, slow-release sodium chloride (Slow Na 30 mmol three times daily with meals), and fludrocortisone acetate (0.1 mg every 6 h),
   • PAC measured at 10:00 h in seated patients after two to three hours upright, failed to suppress to below 6 ng/dL if:
     ✓ upright PRA was suppressed to less than 1.0 ng/mL·h;
     ✓ plasma potassium was within the normal range;
     ✓ plasma cortisol was lower at 10:00 h than at 08:00 h, excluding an acute increase in adrenocorticotropic hormone that may have prevented suppression of aldosterone.

## RESULTS

**TABLE 1.** Demographic and biochemical values

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Essential hypertension (n = 21)</th>
<th>Primary aldosteronism (n = 21)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (%)</td>
<td>71</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Age (yr)</td>
<td>56.3 ± 10.5</td>
<td>55.8 ± 7.7</td>
<td>0.8543</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>29.7 ± 4.5</td>
<td>31.7 ± 3.4</td>
<td>0.1055</td>
</tr>
<tr>
<td>Duration of hypertension (months)</td>
<td>80.1 ± 90.3</td>
<td>73.2 ± 65.7</td>
<td>0.8357</td>
</tr>
<tr>
<td>Number of medicines</td>
<td>2.8 ± 1.1</td>
<td>2.2 ± 0.9</td>
<td>0.0887</td>
</tr>
<tr>
<td>Serum potassium (mEq/liter)</td>
<td>4.0 ± 0.4</td>
<td>3.7 ± 0.3</td>
<td>0.0018</td>
</tr>
<tr>
<td>CrCl (ml/min)</td>
<td>98.8 ± 40.1</td>
<td>136.4 ± 44.8</td>
<td>0.0074</td>
</tr>
<tr>
<td>ARR</td>
<td>9.7 ± 8.5</td>
<td>52.5 ± 45.8</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Urinary volume (ml)</td>
<td>1999 ± 815.9</td>
<td>2222 ± 792.7</td>
<td>0.3810</td>
</tr>
<tr>
<td>Urinary sodium (mmol/d)</td>
<td>155.5 ± 65.6</td>
<td>216.1 ± 65.6</td>
<td>0.0047</td>
</tr>
<tr>
<td>UK (mmol/d)</td>
<td>76.2 ± 25.8</td>
<td>78.6 ± 26.9</td>
<td>0.0496</td>
</tr>
<tr>
<td>Mean 24 h BP (mm Hg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systolic</td>
<td>146.3 ± 14.7</td>
<td>146.0 ± 16.8</td>
<td>0.9613</td>
</tr>
<tr>
<td>Diastolic</td>
<td>84.3 ± 9.7</td>
<td>84.6 ± 8.5</td>
<td>0.9198</td>
</tr>
</tbody>
</table>

# RESULTS

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</tr>
</thead>
<tbody>
<tr>
<td>LVEDD (cm)</td>
<td>49.4 ± 5.8</td>
<td>54.2 ± 4.2</td>
<td>0.0043</td>
</tr>
<tr>
<td>Interventricular septum (cm)</td>
<td>1.0 ± 0.1</td>
<td>1.2 ± 0.2</td>
<td>0.0009</td>
</tr>
<tr>
<td>PW (cm)</td>
<td>1.0 ± 0.2</td>
<td>1.2 ± 0.2</td>
<td>0.0040</td>
</tr>
<tr>
<td>LVM (g)</td>
<td>213.8 ± 57.7</td>
<td>261.1 ± 59.2</td>
<td>0.0123</td>
</tr>
<tr>
<td>LVMI (g/m²)</td>
<td>108.5 ± 24.5</td>
<td>124.9 ± 23.6</td>
<td>0.0329</td>
</tr>
<tr>
<td>LV end diastolic volume (ml)</td>
<td>80.6 ± 22.2</td>
<td>115.1 ± 29.3</td>
<td>0.0001</td>
</tr>
<tr>
<td>LV end systolic volume (ml)</td>
<td>29.4 ± 11.5</td>
<td>44.3 ± 15.7</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

RESULTS - CONTROLS

**Interventricular Septum**
- $r=0.3296$
- $p=NS$

**Posterior Wall**
- $r=0.2739$
- $p=NS$

**LV Mass**
- $r=0.2499$
- $p=NS$

- $r=0.1382$
- $p=NS$

RESULTS - PAL

CONCLUSIONS

1. Dietary salt independently predicts LV thickness and mass in patients with primary aldosteronism, but not in patients with essential hypertension.

2. Our results extend the findings in experimental studies to humans in suggesting that aldosterone excess may require high dietary salt to have the most pronounced effect in determining target-organ damage in patients with PA.

CLINICAL IMPLICATIONS

If confirmed, treatment strategies based on aldosterone blockade by mineralocorticoid receptors blockers, or reduction by unilateral adrenalectomy, associated with dietary strategies markedly reducing salt intake should translate into target organ protection and, consequently, reduction in CV risk among patients with PA.