Effect of Salt Intake on Kidney Weight in Uninephrectomized Spontaneously Hypertensive Rats (SHR). Masahiro Kihara, Yukio Yamori, Yasuo Nara, and Ryoichi Horie. Department of Pathology, Shimane Medical University, and Japan Stroke Prevention Center, Izumo 693, Japan.

INTRODUCTION

Emphasis has been put on the role of the kidney in the pathogenesis of hypertension and a great body of data has been accumulated on the physiological aspect of kidney in hypertensive state and also on humoral factors such as renin and aldosterone, but little document on the kidney weight in hypertension except for nephrosclerotic contracted kidney secondary to arteriosclerosis. Our recent study revealed the fact that relative kidney weight was significantly larger in the Japanese than in the New Zealanders (unpublished) in contrast to the incidences of hypertensive diseases such as stroke which were greater in the former than the latter. So the present study was planned to examine experimentally whether such a difference in the kidney weight was caused by nutritional conditions, especially salt intake because there is a remarkable difference in salt intake between the Japanese and the New Zealanders.

MATERIALS AND METHODS

Thirty seven female SHR and 17 female Wistar-Kyoto rats (WKY) at the age of 3 months, after the unilateral nephrectomy of the left kidney, were placed under the following experimental conditions: (1) 9 SHR given 1% NaCl in drinking water, (2) 9 SHR given tap water for drinking, (3) 9 SHR given 1% NaCl and hydralazine (apiracol 8 mg/l) in drinking water, (4) 9 SHR given tap water and hydralazine, (5) 9 WKY given 1% NaCl and (6) 8 WKY given tap water. All rats were sacrificed after 2 months. Blood pressure and body weight were measured before nephrectomy, one month after and before sacrifice. Kidney weight was measured at the time of nephrectomy and at sacrifice after the cautious removal of adipose tissues at the hilus and around the kidney. Blood samples were taken at sacrifice to check hematocrit values. Blood pressure was indirectly measured by the tail pulse puck-up method.

RESULTS

Before nephrectomy blood pressure was ranged from 155 to 170 mmHg in SHR and from 100 to 130 in WKY, no intergroup differences either in 4 SHR groups or in 2 WKY groups. After 2 months blood pressure was significantly higher in the SHR group with salt than in other groups, and remained unchanged in the SHR group with water or in both WKY groups from the prevalues. In the SHR groups with hydralazine, blood pressure was significantly decreased down to the same level as in the WKY. Hematocrit was elevated higher than 50% only in the SHR group with water while ranged from 44 to 46% in other groups. There was no significant difference in relative kidney weights (g per 100g of body weight) at the time of nephrectomy among these experimental groups; around 0.35 in each group. But after 2 months, the kidney weights were significantly heavier in the NaCl groups than their counter parts and there were no differences either between 2 NaCl groups (from 0.57 to 0.60) or between tap water groups (from 0.52 to 0.54).

DISCUSSION

The present study clearly showed that salt intake has an obvious nephrotophilic effect independent of the level of the blood pressure. So there is a possibility that the difference in kidney weights between the Japanese and the New Zealanders may be ascribed to the difference in salt intake between them. (This study was supported by grants from the Ministry of Education, Japanese Heart Foundation, and Salt and Tobacco Public Monopoly Corporation. Authors are grateful for the cooperation of Mr. K. Omura.)