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Research Article

Salt intake, knowledge of salt intake, and blood pressure control in Chinese hypertensive patients

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Abstract

A cross–sectional study involving 2502 subjects was conducted to evaluate salt intake, knowledge of salt intake, and blood pressure control in hypertensive patients. The blood pressure control rate was 33.5% among the hypertensive patients. Of the patients, 69.9% had salt intake higher than 6 g/d. Overall 35.0% knew the recommended salt intake, and 94.9% knew that ''excess salt intake can result in hypertension.'' Altogether, 85.8% of patients had received health education related to a low–salt diet at some time. Patients who consumed less than 6 g/d of salt had a higher control rate than those who consumed more than 6 g/d (48.7% vs. 27.0%; $\chi^2 = 111.0$; $P < .001$). Patients with knowledge of the recommended salt intake had a higher control rate than those without (45.8% vs. 26.9%; $\chi^2 = 91.3$; $P < .001$). Our findings suggest a high salt intake and low blood pressure control rate among Chinese hypertensive patients. Knowledge of recommended salt intake is inappropriate for patients with education of a low–salt diet. J Am Soc Hypertens 2014;8(12):909–914. © 2014 American Society of Hypertension. All rights reserved.

Keywords: Blood pressure control; cross-sectional study; hypertension; health education; recommended salt intake.

Introduction

Hypertension has been identified as the leading risk factor of mortality and the third leading risk factor of the total burden of disease globally.[1] It was estimated that one–quarter of the world's adults had hypertension in the year 2000, and that the proportion will increase to 29% by 2025.[2] In China, the prevalence of hypertension has increased rapidly.[3] The prevalence of hypertension in the adult population has quadrupled from 5% in 1959 to nearly 19% in 2002.[4] The 2007–2008 China National Diabetes and Metabolic Disorders Study showed a total of 26.6% of Chinese adults aged 20 years and older had hypertension.[5] Another national cross–sectional survey found that the adjusted prevalence of hypertension was 29.6%.[6] The control rate among all hypertensive patients was quite low, varying from 9.3% to 11.1%.[5,6] Even in treated hypertensive patients, the control rate was less than 30%.[6,7]

Many dietary factors affect blood pressure, and high salt intake is one of the presumed causative factors.[3] In 2002, the average daily salt intake for a reference adult male (aged 18 years with a light level of physical activity) was 12 g per day in Chinese adults,[8] twice that recommended by the China Nutrition Association in 2011.[9] A cohort of 16,869 Chinese adults aged 20–60 years over the period 1991–2009 indicated that sodium intake still remains at high levels, double those of World Health Organization recommendations.[10] Most dietary sodium came from salt and high–salt condiments added during cooking.[11] The main sources of salt intake from weighed condiments recorded were from home cooking salt (74.7%) followed by soy sauce (15.0%).[12]

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Although the effect of salt intake on blood pressure remains controversial in different publications,[13–15] dietary sodium reduction has been considered one of the methods to maintain normal blood pressure,[16] even in resistant hypertension cases.[17] Reduction of dietary sodium intake is now a worldwide measure for helping to control blood pressure. In China, an authoritative document has been developed to guide Chinese health care providers in developing hypertension prevention initiatives in urban communities or rural villages.[18] However, there have been few studies to investigate knowledge of salt intake in relation to blood pressure control, which may help public health education and promotion. Hence, we conducted a cross–sectional study to evaluate salt intake, knowledge of salt intake, and blood pressure control in hypertension patients.

Methods

Sampling

The study site is in Xuzhou City, one of the 13 cities in Jiangsu Province, the eastern part of China. Using multi–stage cluster sampling methods, one district and one county were random sampled from five districts and five counties of the City. One community health service and one town health clinic were randomly sampled from the district and county, respectively. Patients who were aged 18 years and older, had been diagnosed with hypertension, registered in the community health service and town health clinic before 1 July 2012, had at least 3 months since diagnosis of hypertension, and were willing to participate were recruited in the study. The exclusion criteria were psychological disease, other severe diseases that prevented attending the survey; hypertension of pregnancy, planning a pregnancy, lactating women, and secondary hypertension.

If the loss–to–follow–up is 10%, a sample size of 1451 will be able to detect a 15% difference of the hypertension control rate between the two groups with a power of 95% (at the level of $\alpha = 0.05$).

Written consent was obtained from all the participants. The study was approved by the Human Investigation Review Committee at Xuzhou Center for Disease Control and Prevention.

Blood Pressure Control

Participants were asked to avoid alcohol, cigarette smoking, coffee/tea, and exercise for at least 30 minutes. Blood pressure was measured three times on the right arm by clinical practitioners with the participants in a seated position after 5 minutes of rest, using a standard mercury sphygmomanometer and an appropriately sized cuff according to a standard protocol.[19] Blood pressure control was defined as (1) blood pressure <140/90 mm Hg for hypertensive patients aged younger than 65 years; (2) blood pressure <150/90 mm Hg for hypertensive patients aged 65 years and older; (3) blood pressure <130/80 mm Hg for hypertensive patients with diabetes, nephroma, and cardiovascular diseases.[18]

Salt Intake

A validated food frequency questionnaire was used to collect information on intake of salt, monosodium glutamate, soy sauce, other sauce, and salted vegetables as well as members of a household for meals at home over the past month.[20] The five condiments were then calculated for salt intake per month by the household according to the food composition tables. Individual salt intake was calculated with salt intake per month per household divided by members of the household based on the participant's food consumption at home. The salt intake was then categorized into two groups with ≤6 and >6 g/d.

Knowledge of Salt Intake

Salt–intake–related knowledge included three questions: (1) ''Do you know the National recommended salt intake?''; (2) ''Do you know excess salt intake results in hypertension?''; and (3) ''Have you ever received health education on a low–salt diet?'' Positive answers were categorized according to knowledge or education.

Questionnaire Interview

A standard questionnaire was administered by trained investigators to obtain information on demographic characteristics and personal and family history of chronic diseases including diabetes, cardiovascular diseases, cigarette smoking, and alcohol drinking. In all participants, height, weight, and waist and hip circumferences were measured by standard methods. Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. Subjects were classified into BMI categories as underweight (BMI <18.5), normal weight (BMI >18.5<24), overweight (BMI ≥24<28), and obese (BMI ≥28), according to Chinese standards. Abdominal obesity was defined as waist circumference ≥85 cm in males or ≥80 cm in females.[21]

Cigarette smoking was defined as smoking everyday for at least 1 year. Information was obtained on the amount and type of alcohol that consumed during the previous year, and alcohol drinking was defined as consumption of at least 30 g alcohol per week during the year. Physical activity was defined as moderate or high intensity activities at least 3 days per week and 30 minutes per day.

Statistical Analysis

Variables were presented as percentage or mean ± standard deviation (SD). Student *t*–test was used to