学 位 論 文 の 要 旨

氏名　　蓼沼　佐岐

学　位　論　文　名	Salt Preference and the Incidence of Cardiovascular Disease in a Japanese General Population: The Jichi Medical School Cohort Study
発　表　雑　誌　名 （巻，初頁～終頁，年）	Health Volume 8, No.1, PP.105-115, January,2016
著　　者　　名	Saki Tadenuma, Hideyuki Kanda, Shizukiyo Ishikawa, Kazunori Kayaba, Tadao Gotoh,Yosikazu Nakamura, Eiji Kajii

論 文 内 容 の 要 旨

INTRODUCTION

Dietary salt intake has been reported to be associated with cardiovascular disease (CVD). The Japanese are known to have higher salt intake than many other populations. Daily salt intake may be estimated by a food frequency questionnaire or by measurement of 24 hour urinary sodium excretion. However, both methods seem inconvenient for general use in mass screening. For these reasons, at health check-up centers or outpatient clinics, salt intake is usually estimated by a questionnaire on salt preference. However, there were few studies that assessed the relationship of salt preference with CVD.

The aim of this study was to clarify the relationships between salt preference and the incidence of CVD and CVD subtypes using about 10 years of follow-up data from a large-scale prospective population-based cohort study conducted in Japan.

MATERIALS AND METHODS

The Jichi Medical School (JMS) Cohort Study is a population-based prospective study that was started to investigate the risk factors for CVD in 12 rural areas in Japan. A total of 12,490 people (4911 men and 7579 women) were enrolled in this study. Mass screening examinations for CVD have been conducted in Japan since 1982 under the direction of the Health and Medical Service Law for the Aged, and we used this system to collect the data. The baseline data were obtained from April 1992 through July 1995. Baseline examinations consisted of physical and

blood examinations and a self-administered questionnaire. We excluded participants with a history of CVD and those with missing data on salt preference. Ultimately, 11,394 subjects were analyzed in the present study. The study protocol was approved by the Ethics Committee of Jichi Medical School and written informed consent was obtained from all subjects.

The subject's height, weight, serum cholesterol concentration, and blood pressure were measured at the baseline physical examination. Body mass index (BMI) was calculated as weight (kg)/height (m) ^{2}. Information on age, smoking habit, alcohol drinking habit, histories of hypertension, diabetes, and hyperlipidemia, and years of education was obtained from responses to the baseline questionnaire.

Salt preference was ascertained with the following question: "Do you like salty foods?" Participants answered with 1 of 5 multiple choice options: "highly favor", "favor", "so-so", "moderately disfavor", or "disfavor". Subjects were divided into three categories of salt preference according to their response: favor: "highly favor" or "moderately favor"; so-so: "so-so"; and disfavor: "moderately disfavor" or "disfavor".

Subjects were asked whether they had a history of CVD after enrolling. Follow-up was conducted from 1995 to 2005. If an incident case of stroke or myocardial infarction (MI) was suspected, those subjects with such histories were asked when and which hospital they visited. We requested duplicate images from computed tomography or magnetic resonance imaging (in cases of stroke) or electrocardiograms (in cases of MI). Criteria for stroke were a focal and nonconvulsive neurological deficit of sudden onset persisting longer than 24 hours. Stroke subtypes were categorized as cerebral hemorrhage, cerebral infarction, or subarachnoid hemorrhage (SAH) according to the criteria of the National Institute of Neurological Disorder and Stroke. MI was diagnosed according to the criteria of the World Health Organization Multinational Monitoring of Trends and Determinants in Cardiovascular Disease (MONICA) Project.

We compared characteristics between salt preference groups by the chi-square test or one-way analysis of variance. Finally, Cox proportional hazards models were used to calculate hazard ratios (HRs) with 95% confidence intervals (CIs) for the incidence of CVD according to salt preference, after adjusting for age, smoking habit, alcohol drinking habit, history of hyperlipidemia, and years of education (HR-all*) for men, and after adjusting for age, smoking habit, and alcohol drinking habit, BMI, HDL-C, and years of education (HR-all†) for women, which were considered to be potential confounding factors.

RESULTS AND DISCUSSION

During a mean follow-up period of 10.7 years, we documented 485 CVD events: 415 strokes, including 264 cerebral infarctions, 94 hemorrhagic strokes, and 56 SAHs, and 76 MIs. In

both men and women, favor salt preference was positively associated with smoking and alcohol drinking.

Among the men, the multivariable adjusted HRs (HR-all*) for incidence of myocardial infarction and subarachnoid hemorrhage for favor versus so-so salt preference were 0.34 (95% CI, 0.17 - 0.71) and 7.10 (0.88 - 56.84), respectively. There were no significant associations between salt preference and CVD or total stroke. Among the women, age-adjusted HRs for the incidence of CVD, total stroke, cerebral hemorrhage, and cerebral infarction for the favor preference were 1.41 (1.02 - 1.95), 1.36 (0.97 - 1.91), 1.79 (0.87 - 3.71), and 1.40 (0.89 - 2.19), respectively. There were no significant associations between salt preference and myocardial infarction or subarachnoid hemorrhage.

We found that salt preference was positively associated with an increased risk of SAH and a decreased risk of MI in men. For women, salt preference was positively associated with an incidence of CVD after age-adjustment. To our knowledge, this study is the first prospective study to provide evidence of the relationship of salt preference with the incidence of stroke.

In our study, favor salt preference was positively associated with smoking and alcohol drinking in both men and women. Despite these results, salt preference was not associated with CVD risk factors such as SBP, DBP, and a history of hypertension. Our results suggest that salt preference may be one of the risk factors of premature CVD.

For men, the decreased risk of MI associated with high salt preference might reflect the beneficial cardiovascular effects of the intake of n–3 polyunsaturated fatty acids and isoflavones. The low incidence of MI and the high incidence of SAH were based on a small number of incident cases. Thus, there was wide range of 95% CIs for the point estimates. For women, high salt preference tended to be less well educated. Therefore, subjects with high salt preference may have behavioral risk factors, leading to higher risk of CVD in the women. Accordingly, women with a high salt preference may intake much more salt than those with a low salt preference.

Especially in women, early assessment of salt preference may be effective in reducing the incidence of CVD. For subjects with high salt preference, early intervention may be able to prevent excessive salt intake in the future.

CONCLUSION

We found that salt preference was positively associated with an increased risk of the incidence of SAH in men after multivariate adjustment and in CVD in women after adjustment for age. As with other common risk factors for CVD, assessing salt preference may lead to the prevention of CVD. These tendencies may apply especially to women.