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Research Article

Grim status of hypertension in rural China: results from Northeast China Rural Cardiovascular Health Study 2013

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Abstract

The last study that reported the prevalence of hypertension in rural Northeast China was conducted approximately 10 years ago. We aimed to update the data on the prevalence and epidemiologic features of hypertension in rural Northeast China. This study examined a total of 11,576 adults using a multi–stage cluster sampling method to select a representative sample of individuals 35 years or older. Sitting blood pressure was measured three times for each participant by trained observers using a standardized electric sphygmomanometer after resting for 5 minutes. Related medical histories were obtained using a standard questionnaire, and blood biochemical indexes were collected by well–trained personnel. Prevalence of hypertension was 51.1%; 53.9% for men and 48.7% for women. Among subjects with hypertension, 43.5% were aware of the diagnosis, and 31.2% were taking antihypertensive medications, but only 6% had their blood pressure controlled. Besides traditional risk factors, multiple logistic regression analysis indicated that obesity, diabetes, dyslipidemia, and hyperuricemia were becoming risk factors for hypertension in this rural area.The status of hypertension is grim currently in rural Northeast China. The prevalence of hypertension remains seriously high, while the control rate is still frustratingly low. Obesity, diabetes, dyslipidemia, and hyperuricemia were more likely to be associated with hypertension in this rural area. J Am Soc Hypertens 2015;9(5):358–364.

Keywords: Blood pressure; control rate; prevalence; risk factor.

Introduction

Hypertension is responsible for 7.6 million premature deaths and 92 million disability–adjusted life–years annually, as well as 54% of incidental stroke and 47% of ischemic heart disease worldwide.[1–4] We conducted a survey to find out the prevalence of hypertension and related risk factors, which is very important for formulating corresponding strategies to prevent and control high blood pressure (BP).

The overall prevalence of hypertension in Chinese reached 27.2% in 2001.[5] A previous study, conducted during 2004–2005, has shown that the prevalence of hypertension was 37.8% in rural Northeast China.[6] However, the prevalence of hypertension in rural China after 2005 has not been studied. Rural China has been experiencing rapid economic progress and epidemiologic transitions. To explore whether the epidemiologic characteristics of hypertension in the rural population have been changed accordingly, we performed a cross–sectional survey of a large rural population in 2013, aiming to update the prevalence, treatment, and control of hypertension, as well as related risk factors for formulating corresponding strategies in further study.

Conflict of interest: none.

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Methods

Study Population and Sampling Strategy

This study is a part of the Northeast China Rural Cardiovascular Health Study (NCRCHS), which was performed between January and August 2013, in a representative sample of people in rural areas of Liaoning Province, located in the Northeast of China. The study adopted a multi–stage, stratified random cluster sampling scheme. In the first stage, three counties (namely Dawa, Zhangwu, and Liaoyang) were selected from the eastern, southern, and northern regions of Liaoning province, respectively. In the second stage, one town was randomly selected from each county (a total of three towns). Finally, in the third stage, six to eight rural villages from each town were randomly selected (a total of 26 rural villages were included). Participants with pregnancy, malignant tumor, or mental disorder were excluded from the present study. All eligible permanent residents aged ≥35 years from each village were invited to participate in the study (a total of 14,016 participants). Of those, 11,956 participants completed the present study (85.3% response rate). The study was approved by the Ethics Committee of China Medical University (Shenyang, China). All procedures were performed in accordance with ethical standards. Written consent was obtained from all participants after they were informed of the objectives, benefits, medical items, and confidentiality agreement of personal information. If the participants were illiterate, we obtained written informed consent from their proxies. Among the 11,956 participants, 380 were excluded during analysis for incomplete data. We used baseline data, and only participants with a complete set of data regarding the variables analyzed in the study were included, making a final sample size of 11,576 (5359 men and 6217 women).

General Data Collection

Data were collected in a single clinic visit by face–to–face interview with cardiologists and trained nurses using a standard questionnaire. Before the survey was performed, we invited all eligible investigators to attend the organized training to explain the purpose of this study, the means of administering the questionnaire, the standard method of measurement, the importance of standardization, and the study procedures. The participants were tested following the training, and only those who scored perfectly on the test could become investigators. Data on demographic characteristics, lifestyle risk factors, dietary habits, family income, psychological evaluation, history of hypertension, family history of cardiovascular diseases, and quality of life were obtained by interview using a standardized questionnaire. A central steering committee and subcommittee was responsible for quality control. The body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in meters.

Data on smoking status, consumption of alcohol, sleep duration, and education level were assessed as a part of the questionnaire. Educational level was categorized into primary school or below, middle school, and high school or above. Family income was classified as ≤5000, 5000–20,000 and >20,000 Chinese yuan (CNY) per year. Self–reported sleep duration (including nocturnal and nap duration) was obtained from the questionnaire. The responses were categorized into four groups: ≤7 hours; >7 hours and ≤8 hours; >8 hours and ≤9 hours; and >9 hours per day. Physical activity included occupational and leisure–time physical activity. A detailed description of the methods for assessing physical activity has been presented elsewhere.[7] Occupational and leisure–time physical activity were merged and regrouped into the following three categories: 1) low—subjects who reported light levels of both occupational and leisure–time physical activity, 2) moderate—subjects who reported moderate or high levels of either occupational or leisure–time physical activity and 3) high—subjects who reported a moderate or high level of both occupational and leisure–time physical activity.[8]

Salt intake was measured by investigating the total amount of salt consumed in a family for 1 year to calculate salt intake for every person in the family in 1 day.

Dietary patterns were assessed by having participants recall the foods they had eaten during the previous year. The questionnaire included questions regarding the average consumption of several food items per week. The reported consumption was quantified approximately in terms of grams per week. Vegetable consumption was assessed on the following scale: rarely = 3; <1000 g = 2; ≥1000 g and ≤2000 g = 1; >2000 g = 0; and meat consumption, including red meat, fish, and poultry was assessed on the following scale: rarely = 0; <250 g = 1; ≥250 g and ≤500 g = 2; >500 g = 3. A special diet score (vegetable consumption score plus meat consumption score) was calculated for each participant (range, 0–6). Higher values of the diet score indicated higher meat consumption, lower vegetable consumption, and greater adherence to a Westernized diet, while lower values indicate adherence to the Chinese diet. Similar methods for calculating a diet score can be found in the study from the province of Attica in Greece(ATTICA study).[9]

BP Measurements

According to the protocol of the American Heart Association, BP was measured three times at 2–minute intervals after at least 5 minutes of resting, using a standardized automatic electronic sphygmomanometer (HEM–907; OMRON, Tokyo, Japan). The OMRON device was calibrated using a standard mercury sphygmomanometer every month by two technicians according to the British