Risk Management and Healthcare Policy

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METHODOLOGY

Prevalence of Hypertension and 10-Year Cardiovascular Disease Risk Among Older Adults Living in Quanzhou, A Coastal Region of Southeast China

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Objective: This study aims to analyze the prevalence of hypertension and 10-year cardiovascular disease (CVD) risk among older adults living in a coastal region of southeast China.

Methods: A population-based cross-sectional survey of 2018 adults was conducted on 60–98-year-old residents in Quanzhou from September 2016 to March 2018 using multistage stratified cluster random sampling. The 10-year CVD risk was estimated by applying the Chinese model recommended by the Chinese guidelines for CVD prevention.

Results: The overall prevalence of hypertension, prehypertension, and normotension among older adults in Quanzhou was 29.0%, 18.7%, and 52.3%, respectively. The percentage of participants with low, moderate, and high 10-year CVD risk was 49.7%, 36.8%, and 13.5%, respectively. Older age, low salt awareness, and low levels of physical activity were significantly correlated with hypertension. The 10-year CVD risk was higher for men than women and increased with age. Higher blood pressure was associated with a greater 10-year CVD risk.

Conclusion: More than half of the older adults in Quanzhou surveyed by this study were normotensive, and approximately half the participants had a moderate or high 10-year CVD risk. We recommend the implementation of regionally targeted interventions, such as screening of blood pressure and other risk factors, to reduce blood pressure and CVD risk in Chinese populations.

Keywords: prevalence, prediction, hypertension, CVD risk, older adults

Introduction

With the continuous development of population aging, cardiovascular disease (CVD) has become the leading cause of death worldwide. The proper management of CVD-related risk factors, such as hypertension, dyslipidemia, diabetes, and obesity, can significantly reduce the risk of CVD in older people in China.[1–3] Hypertension is considered to be the most important risk factor for CVD, contributing to 45% of global CVD morbidity and mortality.[4] The prevalence of hypertension exceeds 50% among elderly people in China and approaches 90% in those aged ≥80 years.[5] Therefore, it is particularly important that strategies to prevent, diagnose, evaluate, and treat hypertension be targeted at the elderly population in China to reduce the risk of developing CVD. However, many patients in China with hypertension are unaware that they have the disorder or are not receiving treatment.[6]

Risk-assessment tools that evaluate the 10-year CVD risk play an important role in the prevention and control of CVD, and several of these tools have been developed. The National Cholesterol Education Program Adult Treatment Panel III has recommended the use of Framingham risk scoring (FRS)[7] for the stratification of CVD risk. The Chinese

Received: 24 September 2021
Accepted: 20 April 2022
Published: 13 May 2022

guidelines for CVD prevention recommend the use of a Chinese model[8] that allows healthcare professionals to predict the combined risk of ischemic CVD and ischemic stroke using simplified scoring tables. In 2013, the American College of Cardiology/American Heart Association published pooled cohort equations (PCEs)[9] to determine the 10-year atherosclerotic CVD (ASCVD) risk. Some differences have been reported between these risk assessment tools, eg, the 10-year ASCVD risk predicted by the PCEs was higher than the ischemic CVD risk predicted by the Chinese model.[10,11] In part, the differences may be due to the Chinese model being optimized for people in China,[8] whereas the FRS and PCE[7,9] were developed based on populations in North America.

The population aging in Quanzhou has been increasing in recent years, little was known about the prevalence of hypertension and other CVD risk factors among older adults in Quanzhou or the 10-year CVD risk of this population.[5] The aim of this population-based cross-sectional survey is to estimate the prevalence of hypertension and the 10-year CVD risk of older people living in Quanzhou.

Methods

Participants

The subjects for this cross-sectional survey included 2018 adults aged ≥60 years who lived in Quanzhou for at least 6 months during the previous 12 months. The survey used a multistage, stratified, cluster random sampling method to select a sample of permanent residents from four different districts in Quanzhou. During the first stage, sampling from 12 streets in those four districts was stratified based on the Quanzhou population data. During the second stage, one residential community was randomly selected from each of the 12 streets. Finally, a total of 2229 people were sampled and invited to participate in the survey. People with a history of stroke or myocardial infarction (MI), those with missing data regarding CVD risk factors, and those who did not complete the survey were excluded from the study. Following the exclusion of ineligible participants, 2018 of the 2229 people (90.5%) completed the survey and were included in the final analysis. The Ethical Review Committee of Quanzhou approved the study protocol. Written informed consent was obtained from all study participants before inclusion in the study.

Data Collected and Definitions Used

The questionnaire was designed to collect information regarding socio-demographic characteristics and other factors possibly associated with hypertension, and all questionnaires were administered face-to-face by trained interviewers. The participants were stratified into the following age groups according to the Chinese model of 10-year CVD risk:[8] 60–65, 66–70, 71–75, 76–80s, and >80 years. Level of educational was categorized into four groups according to the number of years of education: 1–6, 7–9, 10–12, and >12 years. Smokers were defined as smokers who smoked more than one cigarette a day for consecutive or cumulative 6 months, and the smoking status of the population was divided into current and non-including ex-smoker. Habitual alcohol consumption was defined as drinking on at least 2 days per month over the past 12 months regardless of the quantity of alcohol consumed.[12] Physical activity was defined as participation in physical activity of moderate-to-vigorous intensity at least once a week.[13] Salt awareness was defined as having any knowledge of the World Health Organization's recommendation regarding the optimal salt intake per person per day (6 g).[14]

Height and weight were determined while the participant was wearing light clothing and no shoes, and the value for each parameter was calculated as the average of two measurements made using calibrated equipment. Body mass index (BMI) was calculated as weight (kg) divided by height (m) squared,[15] and the categories used were underweight (<18.5 kg/m^2), normal weight (18.5–23.9 kg/m^2), overweight (24.0–27.9 kg/m^2), and obese (≥28.0 kg/m^2).[15] Waist circumference (WC) was measured at the midpoint between the lower edge of the costal arch and the upper edge of the iliac crest while the participant was standing, and the average of two measurements was used for the analysis.

Blood pressure was measured in the right arm using a mercury sphygmomanometer (model no. 15257224; Yuyue Medical, Jiangsu, China) after a 30-minute rest period while the participant was seated comfortably. The average of three consecutive blood pressure measurements was used in the analysis. Hypertension was defined as systolic blood pressure (SBP) ≥140 mmHg, diastolic blood pressure (DBP) ≥90 mmHg, and/or self-reported antihypertensive treatment during the previous two weeks.[16] Prehypertension was defined as a SBP of 120–139 mmHg and/or a DBP of 80–89 mmHg and not receiving any antihypertensive medications.[16]

Venous blood samples were obtained after at least 12 hours of fasting and stored at −70°C within two hours of collection. Fasting blood glucose (FBG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglyceride (TG) levels were assayed using an automated spectrophotometer and an enzymatic colorimetric method (AU5800 Clinical Chemistry System; Beckman Coulter Inc, Brea, CA, USA). Dyslipidemia was defined as TC ≥ 6.22 mmol/L, LDL-C ≥ 4.14 mmol/L, HDL-C ≥ 1.04 mmol/L, and TG ≥ 2.26 mmol/L.[17] Diabetes mellitus was defined as FBG ≥ 7.0 mmol/L and/or self-reported treatment for diabetes mellitus with antidiabetic medication during the previous two weeks.[18]

Calculation of the 10-Year CVD Risk

The 10-year CVD risk was defined as the risk of first-onset nonfatal or fatal coronary heart disease (including myocardial infarction) or fatal or nonfatal stroke over a 10-year period among people free from ASCVD at the beginning of the period.[19] The 10-year CVD risk was calculated using the simplified scoring tables developed by Wu et al,[8] as recommended by the Chinese guidelines for CVD prevention. These tables include age, gender, SBP, TC level, history of diabetes mellitus, and current smoking status. The 10% and 20% risk thresholds were used to categorize CVD risk into three groups: low risk (<10%), moderate risk (10–20%) and high risk (>20%).

Calculation of Sample Size

The sample size (N) necessary for this study was calculated to be 1527 based on an 18.8% prevalence (p = 0.188) of hypertension, a 2.0% uncertainty level (d = 0.02), and a 95% confidence interval (z statistic = 2), using the formula $N = z^2 p (1 - p) \div d^2$.[12]

Statistical Analysis

The analysis was performed using SPSS 21.0 (IBM, Armonk, NY, USA). Continuous variables are expressed as mean ± standard deviation, and categorical variables are presented as percentages. Age and other anthropometric characteristics were compared between groups using Student's *t*-test. Blood pressure was compared between groups using the chi-squared test or Goodman–Kruskal gamma. Univariate and multivariate logistic regression analyses were used to evaluate whether age, physical activity, and salt awareness were independently associated with hypertension. Odds ratios and 95% confidence intervals were calculated. $P < 0.05$ was considered to be statistically significant.

Results

Socio-Demographic and Clinical Characteristics of the Study Participants

The characteristics of the study participants are presented in Table 1. Of the 2018 participants, 986 (48.9%) were male, with a mean age of 69.2 ± 16.5 years, and 1032 (51.1%) were female, with a mean age of 70.1 ± 16.0 years. The mean SBP and DBP were 134.5 ± 17.3 and 85.1 ± 14.2 mmHg for all subjects, 135.8 ± 18.4 and 86.3 ± 15.5 mmHg for men, and 133.1 ± 17.6 and 83.9 ± 13.7 mmHg for women, respectively. There were no significant differences between males and females in terms of age, FBG level, TC level, or HDL-C level. However, the remaining parameters differed significantly between the genders. When compared with the women, the men had a higher percentage of current smokers and habitual drinkers; higher levels of education and physical activity; lower salt awareness; higher SBP, DBP, BMI, WC, and LDL-C levels; and lower TG levels ($P < 0.05$; see Table 1).

Prevalence of Hypertension, Prehypertension, and Normotension

Table 2 shows the characteristics of the study participants stratified according to blood pressure (normotensive, prehypertensive, or hypertensive). Among the older adults in Quanzhou included in the study, 1055 (52.3%) had normal blood pressure, 377 (18.7%) had prehypertension, and 586 (29.0%) had hypertension. The prevalence of hypertension varied significantly between age groups ($P < 0.001$) and was notably higher in participants aged 76–80 years (151 of 338, 44.7%) and 71–75 years (194 of 655, 29.6%) than in those aged 60–65 years (89 of 355, 25.1%), 66–70 years (136 of

Table 1 Socio-Demographic and Clinical Characteristics of the Older Adults in Quanzhou Who Participated in the Study

Characteristic	All Participants (n = 2018)	Males (n = 986)	Females (n = 1032)	*P*
Age (years)	69.65 ± 15.51	69.23 ± 16.46	70.11 ± 15.97	0.223
Smoking status				<0.001
Smoker	668 (33.1%)	653 (66.2%)	15 (1.5%)	
Nonsmoker	1350 (66.9%)	333 (33.8%)	1017 (98.5%)	
Alcohol consumption				<0.001
Regular drinker	588 (29.1%)	413 (41.9%)	175 (17.0%)	
Nondrinker/occasional drinker	1430 (70.9%)	573 (58.1%)	857 (83.0%)	
Educational level				<0.001
Below primary school	808 (40.0%)	345 (35.0%)	463 (44.9%)	
Primary school	546 (27.1%)	257 (26.1%)	289 (28.0%)	
Junior school	432 (21.4%)	245 (24.8%)	187 (18.1%)	
Senior school or above	232 (11.5%)	139 (14.1%)	93 (9.0%)	
Physical activity				<0.001
Yes	945 (46.8%)	598 (60.6%)	347 (33.6%)	
No	1073 (53.2%)	388 (39.4%)	685 (66.4%)	
Salt awareness				0.026
Yes	490 (24.3%)	218 (22.1%)	272 (26.4%)	
No	1528 (75.7%)	768 (77.9%)	760 (73.6%)	
BMI, (kg/m^2)	23.78 ± 4.25	24.56 ± 4.12	23.11 ± 4.32	<0.001
Waist circumference (cm)	82.21 ± 10.41	84.54 ± 11.23	79.67 ± 10.36	<0.001
Fasting blood glucose (mmol/L)	5.42 ± 1.25	5.44 ± 1.31	5.43 ± 1.26	0.861
Total cholesterol (mmol/L)	5.12 ± 1.18	5.13 ± 1.22	5.11 ± 1.14	0.352
Low-density lipoprotein cholesterol (mmol/L)	3.37 ± 0.81	3.42 ± 0.89	3.31 ± 0.76	0.003
High-density lipoprotein cholesterol (mmol/L)	1.03 ± 0.27	1.02 ± 0.21	1.03 ± 0.32	0.204
Triglycerides mmol/L	1.65 ± 0.76	1.62 ± 0.55	1.68 ± 0.84	0.030
Systolic blood pressure (mmHg)	134.45 ± 17.32	135.76 ± 18.44	133.11 ± 17.56	<0.001
Diastolic blood pressure (mmHg)	85.11 ± 14.17	86.34 ± 15.45	83.87 ± 13.69	<0.001

Note: Data are presented as mean ± standard deviation or n (%).
Abbreviation: BMI, body mass index.

596, 22.8%), and >80 years (16 of 74, 21.6%). By contrast, the prevalence of prehypertension was much higher in participants aged >80 years (25 of 74, 33.8%) than in the other age groups. Elevated blood pressure was also associated with male gender, smoking, regular alcohol consumption, diabetes mellitus, dyslipidemia, hyperuricemia, high BMI, abdominal obesity, low physical activity, and poor salt awareness ($P \leq 0.001$; see Table 2).

Logistic Regression Analysis of Factors Associated with Hypertension

Multivariate logistic regression analysis with 3-level blood pressure (normotensive, prehypertensive, or hypertensive) as the dependent variable showed that increasing age, poor salt awareness, and low physical activity were significantly associated with hypertension in older adults residing in Quanzhou ($P < 0.05$; see Table 3).

Associated 10-Year CVD Risk

Among the adults in our study, the 10-year CVD risk was low in 49.7% (1002 of 2018), moderate in 36.8% (743), and high in 13.5% (273). The predicted 10-year CVD risk differed significantly between age groups, genders, and blood pressure levels (see Table 4). Notably, most participants with a low 10-year CVD risk were normotensive (70.6%), whereas the vast majority of participants with a high 10-year CVD risk were hypertensive (80.9%).

Table 2 Socio-Demographic and Clinical Characteristics of Older Adults in Quanzhou Stratified According to Blood Pressure

	All Participants (n = 2018)	Normotensive (n = 1055)	Prehypertensive (n = 377)	Hypertensive (n = 586)	P
Age (years)					<0.001
60–65	355 (17.6%)	177 (16.8%)	89 (23.6%)[a]	89 (15.2%)[bc]	
66–70	596 (29.5%)	353 (33.5%)	107 (28.4%)	136 (23.2%)	
71–75	655 (32.5%)	365 (34.6%)	96 (25.5%)	194 (33.1%)	
76–80	338 (16.7%)	127 (12.0%)	60 (15.9%)	151 (25.8%)	
>80	74 (3.7%)	33 (3.1%)	25 (6.6%)	16 (2.7%)	
Gender					0.001
Male	986 (48.9%)	473 (44.8%)	202 (53.6%)[a]	311 (53.1%)[b]	
Female	1032 (51.1%)	582 (55.2%)	175 (46.4%)	275 (46.9%)	
Smoking status					<0.001
Smoker	668 (33.1%)	107 (10.1%)	209 (55.4%)[a]	352 (60.0%)[b]	
Nonsmoker	1350 (66.9%)	948 (89.9%)	168 (44.6%)	234 (40.0%)	
Alcohol consumption					<0.001
Regular drinker	588 (29.1%)	187 (17.7%)	211 (56.0%)[a]	190 (32.4%)[bc]	
Nondrinker/occasional drinker	1430 (70.9%)	868 (82.3%)	166 (44.0%)	396 (67.6%)	
Educational level					0.703
Below primary school	808 (40.0%)	431 (40.9%)	166 (44.0%)	211 (36.0%)[bc]	
Primary school	546 (27.1%)	287 (27.2%)	90 (23.9%)	169 (28.8%)	
Junior school	432 (21.4%)	183 (17.3%)	74 (19.6%)	175 (29.9%)	
Senior school or above	232 (11.5%)	154 (14.6%)	47 (12.5%)	31 (5.3%)	
Diabetes mellitus					<0.001
Yes	456 (22.6%)	113 (10.7%)	132 (35.0%)[a]	211 (36.0%)[b]	
No	1562 (77.4%)	942 (89.3%)	245 (65.0%)	375 (64.0%)	
Dyslipidemia					<0.001
Yes	579 (28.7%)	94 (8.9%)	189 (50.1%)[a]	296 (50.5%)[b]	
No	1439 (71.3%)	961 (91.1%)	188 (49.9%)	290 (49.5%)	
Hyperuricemia					<0.001
Yes	367 (18.2%)	106 (10.0%)	103 (27.3%)[a]	158 (27.0%)[b]	
No	1651 (81.8%)	949 (90.0%)	274 (72.7%)	428 (73.0%)	
Body mass index					<0.001
Underweight	278 (13.8%)	177 (16.8%)	50 (13.3%)[a]	51 (8.7%)[bc]	
Normal weight	875 (43.4%)	588 (55.7%)	164 (43.5%)	123 (21.0%)	
Overweight	447 (22.2%)	132 (12.5%)	138 (36.6%)	177 (30.2%)	
Obese	418 (20.7%)	158 (15.0%)	25 (6.6%)	235 (40.1%)	
Abdominal obesity					<0.001
Yes	539 (26.7%)	167 (15.8%)	28 (7.4%)[a]	344 (58.7%)[bc]	
No	1479 (73.3%)	888 (84.2%)	349 (92.6%)	242 (41.3%)	
Physical activity					<0.001
Yes	897 (44.4%)	513 (48.6%)	240 (63.7%)[a]	144 (24.6%)[bc]	
No	1121 (55.6%)	542 (51.4%)	137 (36.3%)	442 (75.4%)	
Salt awareness					<0.001
Yes	490 (24.3%)	201 (19.1%)	125 (33.2%)[a]	164 (28.0%)[b]	
No	1528 (75.7%)	854 (80.9%)	252 (66.8%)	422 (72.0%)	

Notes: Data are presented as n (%). [a]Normotensive vs prehypertensive, P<0.05; [b]Normotensive vs hypertensive, P<0.05; [c]Prehypertensive vs hypertensive, P<0.05.

Discussion

A notable finding of this cross-sectional survey of older adults in Quanzhou was that 29% had hypertension and nearly 19% had prehypertension. Furthermore, the univariate analysis indicated that older age, lower salt awareness, and lower levels of physical activity were significantly associated with hypertension. Despite more than half of the participants being normotensive, the 10-year CVD risk was moderate in 36.8% and high in 13.5%. Importantly, the 10-year CVD risk was higher for men and increased with age and increasing blood pressure. In view of these findings, we recommend that

Table 3 Multifactor Logistic Analysis of the Effect of Blood Pressure Control in Older Adults Residing in Quanzhou with Hypertension

Dependent Variable	Factor	B	SE	Wald X^2	*P*	Odds Ratio	95% CI
Prehypertensive	Age, year	0.809	0.287	7.911	0.009	2.248	1.136–4.135
	Salt awareness (No ref)	0.435	0.204	4.542	0.042	1.337	1.122–3.934
	Physical activity (No ref)	0.872	0.385	5.259	0.034	3.334	1.215–7.754
Hypertensive	Age, year	0.722	0.279	6.697	0.021	2.059	1.186–4.094
	Salt awareness (No ref)	0.653	0.301	4.706	0.033	1.921	1.135–3.885
	Physical activity (No ref)	0.611	0.332	3.387	0.041	1.842	1.122–3.779

Abbreviations: 95% CI, 95% confidence interval; B, coefficient for the constant; SE, standard error of the coefficient for the constant; Wald X^2, Wald chi-square statistic.

Table 4 Associated CVD Risk in Older Adults in Quanzhou

	Low Risk (n = 1002)	Moderate Risk (n = 743)	High Risk (n = 273)	*P*
Gender				<0.003
Male	463 (46.2%)	365 (49.1%)	158 (57.9%)[bc]	
Female	539 (53.8%)	378 (50.9%)	115 (42.1%)	
Age (years)				0.009
60–65	170 (17.0%)	108 (14.5%)[a]	77 (28.2%)[bc]	
66–70	355 (35.4%)	172 (23.1%)	69 (25.3%)	
71–75	311 (31.0%)	284 (38.2%)	60 (22.0%)	
76–80	136 (13.6%)	153 (20.6%)	49 (17.9%)	
>80	30 (3.0%)	26 (3.5%)	18 (6.6%)	
Blood pressure				<0.001
Normotension	708 (70.6%)	337 (45.3%)[a]	10 (3.7%)[bc]	
Prehypertension	148 (14.8%)	187 (25.2%)	42 (15.4%)	
Hypertension	146 (14.6%)	219 (29.5%)	221 (80.9%)	

Notes: [a]Low risk vs moderate risk, P<0.05; [b]Low risk vs high risk, P<0.05; [c]Moderate risk vs high risk, P<0.05.

high-risk individuals be identified using screening methods so that appropriate interventions to reduce the CVD risk can be implemented, such as adequate treatment for hypertension.

A recent study of 1.7 million adults in China indicated that nearly half had hypertension and that the prevalence of hypertension is rising.[20] However, hypertension is often inadequately controlled in people in China,[20] and the effective management of high blood pressure in the elderly remains a problem.[6] Previous studies in China have reported remarkable variations in the prevalence of hypertension between provinces and municipalities. For example, a survey by Yin et al showed that the total prevalence of hypertension was 26.9% in Fujian, 57.1% in Shanghai, and 65.0% in Beijing.[21] A systematic analysis of previous population-based studies found that the overall prevalence of hypertension in China is 28.9%, with substantial variation between the provinces.[22] Another survey of adults in China determined that the overall prevalence of hypertension and prehypertension was 60.1% and that the highest prevalence (85.6%) was observed in people aged ≥60 years residing in the north of the country.[23] According to Yuli Huang's statistics, the proportions of optimal BP, prehypertension and hypertension were 39.1%, 38.6% and 22.3%, respectively in people aged ≥35 years of Shunde area in southern China.[24] Other studies also showed that the prevalence of prehypertension is much higher.[25,26] Therefore, our finding that the prevalence of hypertension was 29% in older adults in Quanzhou (Fujian province) is comparable with previous reports on the Fujian province[21] and China overall[22] but lower than that observed in some regions of the country. The main consideration may be related to the difference in sample size and the diagnosis of prehypertension. Not only is the incidence of hypertension high, but the incidence of pre-hypertension in the elderly is also high, which is related to the reduction of blood vessel elasticity in the elderly and long-term high-salt, high-fat diet and other factors.

Previous studies have reported that the prevalence of hypertension is significantly higher in the northern than in the southern coastal regions of China (36.2% and 26.2%, respectively) and higher in the inland than in the coastal areas (33.9% and 29.1%, respectively).[27] Likely reasons for these variations are differences in the exposure to risk factors for hypertension. It has been suggested that dietary factors, such as salt intake, contribute to the higher blood pressure experienced by people in northern China when compared with those in southern China.[28] Our multivariate logistic retrospective analysis also supported this finding. Age, salt awareness and physical activity are all associated with the onset of hypertension. The OR values of salt awareness and physical activity were 1.337 and 3.334, respectively, that is, the risk of hypertension in the poor salt awareness group was 1.337 times that of other groups, and the group with the same low levels of physical activity was 3.334 times that of other groups, indicating that poor salt awareness and low levels of physical activity are associated with hypertension. Therefore, the lower prevalence of hypertension in the participants in the current study than that reported for some other regions of China may, at least in part, be due to lower daily salt intake and higher levels of physical activity.

Quanzhou is located in the Fujian province and is the origin of the ancient Maritime Silk Road. As a result, Quanzhou has its own unique environmental and socioeconomic factors. It is generally believed that the residents of Quanzhou have a high salt awareness and a diet rich in fresh fruit, vegetables, seafood, and tea. The relevance of diet to hypertension and CVD is widely recognized, eg, several studies have shown that salt intake is related to blood pressure and cardiovascular outcomes.[29–31] Furthermore, the diet recommended by the Dietary Approaches to Stop Hypertension[32] has been demonstrated to decrease blood pressure and reduce the risk of CVD. A lack of physical activity is also an established risk factor for hypertension.[33–35] Older, retired people, such as those in our study, have more leisure time in which to do exercise, and physical activity may ameliorate the age-related decline in vascular function through reducing both oxidative stress and inflammation,[36] helping to maintain blood pressure within the normal range, and reducing the risk of age-related vascular pathology.

Consistent with our findings, a previous investigation estimated that the average 10-year CVD risk among adults aged 40–79 years without self-reported stroke or MI was 12.6% and that approximately half of the Chinese adults in this age group have a moderate or high ASCVD risk.[10] In the present study, 13.5% of older adults had a high 10-year CVD risk, 80.9% of whom had hypertension, and nearly 50% of older adults had a low 10-year CVD risk, 70.6% of whom were normotensive. These results clearly illustrate the association between elevated blood pressure and a higher 10-year CVD risk. There is evidence to show that the intensive control of SBP can reduce CVD risk and mortality in adults, including the older population.[37–39] Stratified analyses have revealed that age is not the single most important variable in assessing CVD risk. Therefore, identifying CVD risk in older individuals should be based on the assessment of several risk factors, especially those that are amenable to lifestyle modification (such as diet and physical activity) or medical intervention (such as hypertension).

Our study has certain limitations that deserve mention. The sample size was small, and the geographic distribution was narrow. Furthermore, the cross-sectional study design could not establish the direction of some associations, and not all risk factors were considered, resulting in the underestimation of the percentage of older populations with a 10-year ASCVD risk. In addition, we did not exclude people with white-coat hypertension or secondary hypertension from the study, and age-associated hypertension, such as nocturnal hypertension and morning hypertension, were not considered. In addition, individuals with diabetes or dyslipidemia were not excluded, with the aim of obtaining a representative cohort of people with hypertension, but this may have influenced the findings. Future studies are needed to identify the appropriate blood pressure range for older people in China, confirm the prevalence of geriatric hypertension in this population, and assess how well hypertension is being controlled. In addition, the importance of CVD risk stratification in the elderly population should be highlighted to facilitate the identification of high-risk individuals with modifiable risk factors, as this will allow the implementation of timely interventions to reduce CVD risk.

Conclusion

In summary, the prevalence of hypertension and prehypertension among older adults in Quanzhou was 29% and 18.7%, respectively. Furthermore, approximately half of the elderly adults were considered to have a moderate or high 10-year CVD risk. Older age, poor salt awareness, and low levels of physical activity were significantly associated with geriatric hypertension, which in turn increased the predicted risk for CVD. We recommend that regionally targeted interventions, such as screening of blood pressure and associated risk factors, should be implemented in China to reduce blood pressure and hence, CVD risk at the population level.

Ethics Statement

This study was conducted with approval from the Ethics Committee of The First Hospital of Quanzhou affiliated to Fujian Medical University. This study was conducted in accordance with the declaration of Helsinki. Written informed consent was obtained from all participants.

Disclosure

The authors report no conflicts of interest in this work.

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