Population and prevalence of hypertension in different regions of China

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Abstract: Hypertension is the most common chronic disease in the Chinese population. The study analyzes the differences of hypertension in different regions in China from space, analyzes the influencing factors of the disease, and the spatial distribution of different populations. The data comes from CHARLS Harmonize. 22,310 interviewees were selected to respond effectively. Single-factor chi-square test and binary logistic regression were used to analyze the factors affecting hypertension. BMI, urban and rural areas, jogging 1KM, smoking, drink, gender, education status, public medical insurance and hypertension chi-square test are significant, BMI (OR=1.193 95%CI 1.182~1.203), age (OR =1.049, 95%CI 1.045~1.053). There is a spatial difference in the prevalence of hypertension in China, which provides a spatial reference for the control and prevention of different regions, so as to better prevent and treat patients with hypertension. Keywords: hypertension, spatial difference, CHARLS data

1 INTRODUCTION

Cardio-cerebrovascular diseases (CVD) has become a threat to the safety and health of people worldwide. Cardio-cerebrovascular diseases (CVD) accounted for more than one-third of adult death in China in 2010 [1]. Hypertension is one of the most important causes of MORTALITY from CVD. Hypertension can cause serious health problems and increase the risk of death with related diseases [2]. In 2002, 153 million adults suffered from hypertension. In 2013, the control rate of adults with hypertension in China was only 9.7% [3,4].

About one-third of people in a recent survey have high blood pressure, which has become China's second disease [5,6]. With the continuous development of China's economy and the consequent intensification of social aging, the number of people with high blood pressure will continue to rise.

From the distribution of populations in different regions, we studied the spatial distribution of hypertension and found the prevalence in different regions and regions, and spatially discovered hypertension in different regions. The characteristics of the patient population reduce the overall prevalence of hypertension.

2 Methods

2.1 Study population

CHARLS is a continuous elderly care tracking survey currently carried out in China. The CHARLS Harmonized version is for CHARLS to interact with the global elderly care tracking survey, Select 2015 CHARLS data. CHARLS adopts very strict random sampling. All county-level units in the country are classified by region, According to the PPS (Probability Proportional to Size) method, 150 districts and counties and 450 village-level units are randomly selected in urban and rural and per capita GDP stratification; in each county-level unit, three village-level units are randomly selected according to the PPS method; in each In the village or community, draw residential maps and make a list of households [7-9].

2.2 Measurements

Hypertension is defined as self-reported hypertension; the physical test found blood pressure DBP (90mmHg) or SBP (140mmHg), meeting either of these criteria is considered hypertension [10]. BMI body mass index was used to determine the critical level of overweight based on WGOC using BMI in the general population (24.0), and according to the WS/T 428-2013 (China) standard, determines the optimal BMI Chinese adult critical value is $24 kg/x^2$[11]. Education level included Less than lower secondary, upper secondary & vocational training, tertiary.

2.3 Statistical analysis

Chi-square for single-factor analysis x^2 test Hypertension prevalence data, BMI, gender, public health insurance,

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urban and rural areas, education status, jogging for 1KM, smoking and drinking were analyzed to explore the relationship between hypertension and variables, and $p<0.05$ was considered to have significant statistical difference [12]. Binary logistic further scores on age, smoking, drinking, BMI index to further explore the relationship between a factor and hypertension, using odds ratios (ORs) with 95% confidence intervals (CIs); two-tailed $P < 0.05$ were considered statistically significant [13].

3 Results

A total of 25,504 people were surveyed and 22,310 people were selected to be included in the analysis model. Chi-square test showed that BMI, urban and rural area, jogging for 1KM, smoking and drinking were significant $p<0.0001$, gender, education status and public health insurance were $p<0.005$, and the single factor included in the analysis had significant influence on hypertension. BMI (TABLE 1). The prevalence rate gap between male and female was 1.91%, and there was a difference between female and male. The prevalence was 23.12% in 45-49 years old, 45.19% in over 70 years old, and 22.07% under 40 and over 70 years old. The difference of 28.72% between 50-59 years old and 39.76% between 60-69 years old is 11.04%. There is a significant gap in prevalence among people over 60 years old. The education level of junior high school and below accounted for 88.88% of the interviewed population, the most significant difference in the prevalence of education level is 4.58%, and the difference in education level is not much different in the prevalence rate. Among the respondents, there were 14,469 people in rural areas, and rural people accounted for 64.85% of the respondents. There was not much difference between urban and rural areas in the prevalence rate, and there was a difference of 3.47% between urban and rural people. 91.57% of the respondents purchased public health insurance, which has a high coverage rate. The prevalence of obese people is 24.81% higher than that of lean people, the prevalence of obese people is 18.71% higher than that of healthy people, this higher the prevalence of people with higher BMI, the prevalence is also affected by the BMI index.

TABLE 1. Basic characteristics of participants (n=22310)

Variable	Over all	Hypertension	Prevalence (%)	x^2	*P* value
Gender				8.869	0.003*
Male	10836	3709	34.22		
Female	11474	4146	36.13		
Age (years)				526.318	<0.001**
45-49	1998	462	23.12		
50-59	8144	2339	28.72		
60-69	8201	3261	39.76		
≥70	3967	1793	45.19		
Education				12.968	0.002*
Less than lower secondary	19831	7054	35.57		
upper secondary & vocational training	2137	677	31.67		
tertiary	342	124	36.25		
Drink				50.025	<0.001**
Yes	7830	2516	32.13		
No	14480	5339	36.87		
Smoke				112.627	<0.001**
Yes	6308	1880	29.80		
No	16002	5975	37.33		
Jog 1KM				473.736	<0.001**
Yes	11755	4914	41.80		
No	10706	2941	27.86		
Region				26.796	<0.001**
Urban	14469	4918	33.98		
Rural	7841	2937	37.45		
Public Health Insurance				4.263	0.041*
Yes	20430	7234	35.40		
No	1880	621	33.03		
BMI				931.286	<0.001**
>18.5	1341	281	20.95		
18.5-24	10809	2924	27.05		
>24	10160	4650	45.76		

Note: *$P < 0.05$; **$P < 0.01$; BMI, body mass index.

Binary Logistic regression took the incidence of hypertension as the dependent variable, and age, alcohol

consumption, BMI, and Age score as independent variables. The BMI thin and healthy people have a lower risk of disease than those with a high BMI index. For every 1 unit increase in the BMI index, the risk of disease increases by 19.3%; age in fact, the impact on the prevalence rate tends to be smaller at a younger age (TABLE 2).

TABLE 2.BMI, Age binary logistic regression

Risk factors	β	x^2	*p* value	*OR* value	95%*CI*
Age	0.048	686.044	< 0.001**	1.049	1.045~1.053
BMI	0.176	1479.693	< 0.001**	1.193	1.182~1.203

Note: *P < 0.05; **P < 0.01; OR, odds ratios; CI, confidence interval.

4 Discussion

The study found that 10,836 males and 11,474 females were interviewed, with the number of male patients 3,709 and the number of female patients 4,146. In the prevalence of young women and men, it is found that there is a difference in the prevalence of men and women. Women should reduce the amount of alcohol consumption to reduce prevalence [14].

We found that the older the prevalence rate is higher, the prevalence rate between the population above 60 and the population below 60 is 7.27%. The prevalence of people over 60 is 41.53%, and this data may continue to rise in the future. A study on the control rate of hypertension among people over 60 found that the prevalence rate is very high, people have a high awareness rate and treatment rate, but a low control rate [15]. The middle-aged and elderly population is the main group of patients with hypertension. Age increases OR=1.049. With the increase of age, people should increase their awareness of controlling hypertension, thereby reducing the prevalence of hypertension.

There was a 24.81% difference between those with a lean BMI and those who were obese. There was an 18.71% difference between those with a healthy BMI and those who were obese. The higher the BMI (OR=1.193), the higher the prevalence rate, BMI has an important influence on the prevalence of hypertension. Overweight and obesity are very common in the Chinese population, and there are differences in obesity between different provinces. Reducing obesity is important for reducing disease [16]. The impact of Chinese adult body weight changes on the prevalence has been found to increase BMI has a significant impact on the prevalence, through lifestyle changes that can reduce the prevalence [17]. Obesity will not only increase the prevalence of high blood pressure but also increase the prevalence of other diseases. More exercise to reduce body weight can greatly reduce the risk of disease.

5 Conclusion

The reasonable distribution of medical institutions will bring better medical conditions for hypertension as much as possible and will play a positive role in reducing the risk of cardiovascular and CVD caused by hypertension in the future. The prevalence and population in different regions are different, so different regions should adopt different methods to control and treat people with hypertension.

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