

Original Article

Analysis for hypertension and related risk factors of physical examination population

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Abstract: Background and Objectives: Essential hypertension is the most common chronic disease. To provide a basis for developing the prevention and control strategies of hypertension by epidemiological investigation on factors related to hypertension in health examination population. Methods: Data of health examination population from Jilin municipal enterprise and public institutions during January 2011 and July 2012 were randomly selected, and statistical analysis was performed for the age, gender, body mass index, blood lipids, blood uric acid, serum creatinine, blood glucose and hypertension classification indexes. Results: 1859 patients were diagnosed as hypertension. The detection rate of hypertension, awareness rate, new discovery rate, treatment rate, control rate and rate of the patients with family history of hypertension were 21.0%, 27.5%, 72.5%, 19.1%, 6.0% and 26.7%, respectively. A statistically significant difference was found in serum creatinine, blood glucose, serum cholesterol, L-DLC, coronary disease, stroke and diabetes mellitus by the comparison among the different blood pressure grades. There was a difference in blood pressure, blood uric acid, blood creatinine, glucose, total cholesterol, triglycerides, H-DLC, L-DLC and other indexes between female and male. No difference was found in the family history of hypertension, renal damage, blood uric acid, triglycerides and H-DLC among the different blood pressure levels. Conclusions: The hypertension in health examination population has the features of high new discovery rate, low awareness rate and low treatment rate. The factors of age, gender, body mass index, serum creatinine, blood glucose, blood cholesterol, L-DLC, coronary heart disease, stroke and diabetes are associated closely with hypertension.

Keywords: Hypertension, related risk factors, health examination, epidemiology

Introduction

Essential hypertension (EHT) is the most common chronic disease and is an important cause and risk factor for a variety of cardiovascular and cerebrovascular diseases. The hypertension has become a major public health problem over the world because it may cause the serious damage to the body organs and induce cerebrovascular accident, coronary heart disease, heart failure, renal failure and other complications [1]. The survey of "Current Status of Nutrition and Health in Chinese Residents" issued by Ministry of Public Health of China showed that the incidence of EHT in Chinese adults was 18.8% (in 2004), and the awareness rate, treatment rate and control rate of hypertension in Chinese Residents were lower (30.20%, 24.7% and 6.1%). The scientific research demonstrated that EHT is the multi-

factorial disease co-determined by the genetic predisposition and environmental factors. The physical examination center is the important sector for screening of hypertension; therefore, we conducted the survey of hypertension in the physical examination center of Jilin city during January 2011 and July 2012 and analyzed the features of hypertension in the different health examination population of Jilin city, providing a basis for the prevention and control strategies of hypertension.

Subjects and materials

Clinical data

A total of 8852 patients who received the physical examination in the physical examination center of Jilin central hospital from January 2011 to July 2012 were collected, and 1859

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Table 1. Mean blood pressure of the hypertensive patients with different genders and ages

Age groups	Male		Female	
	SBP (mmHg)	DBP (mmHg)	SBP (mmHg)	DBP (mmHg)
I	151.34 ± 10.451	89.75 ± 10.017	148.00 ± 6.698	91.00 ± 3.464
II	153.96 ± 15.800	96.62 ± 10.510*	155.42 ± 16.716	95.86 ± 7.682
III	155.47 ± 18.979	99.75 ± 11.776**.#	152.40 ± 16.389	93.95 ± 9.960
IV	157.10 ± 16.365***	98.51 ± 10.947***.##	160.50 ± 16.833***.*	96.19 ± 11.590
V	164.26 ± 17.964****.###.*.###.###	96.71 ± 10.851****.*.###	170.72 ± 19.246****.###.*.###.###	97.30 ± 11.836
Total	156.85 ± 17.568	97.96 ± 11.307	162.64 ± 19.139	96.13 ± 11.264

Comparison between group I and group II showed *P < 0.01; Comparison between group I and group III showed **P < 0.01; Comparison between group I and group IV showed ***P < 0.01; Comparison between group I and group V showed ****P < 0.01; Comparison between group II and group III showed #P < 0.01; Comparison between group II and group IV showed ##P < 0.01; Comparison between group II and group V showed ###P < 0.01; Comparison between group III and group IV showed .P < 0.01; Comparison between group III and group V showed .###P < 0.01; Comparison between group IV and group V showed .***P < 0.01.

patients were diagnosed with hypertension, in which, 1348 males and 511 females (mean age: 51.13 ± 12.741 years (range: 23~90 years)).

Hypertension grading standards

According to *Chinese Guideline for Hypertension Prevention and Treatment* in 2005, the blood pressures are graded as follows:

Grade 1: SBP was 140-159 mmHg and/or DBP was 90-99 mmHg; grade 2: SBP was 160-179 mmHg and/or DBP was 100-109 mmHg; grade 3: SBP ≥ 180 mmHg and/or DBP ≥ 110 mmHg. The blood pressure was measured with desktop sphygmomanometer according to WHO criteria, ² and was recorded based the mean value of two measurements at examination.

Grouping criteria

The patients were grouped according the age, gender and hypertension levels. The grouping criteria based on age was as followings: the patients aged 20-29 were included in group I, aged 30-39 in group II, aged 40-49 in group III, aged 50-59 in group IV and aged > 60 in group V. The grouping criteria based on gender was as follows: the patients were divided into two groups (male group and female group). Refer to hypertension grading standards for the grouping criteria based on hypertension levels.

Recorded contents

1) General data including age and gender. 2) Medical history including the history of hyper-

tension, diabetes, coronary heart disease, cerebrovascular disease, renal disease and family history of hypertension. 3) Physical examination (the height (m), body weight (Kg) and blood pressure (mmHg) were measured and then record. 4) Biochemical indicators including total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C), fasting blood glucose (FBG), uric acid (UA) and serum creatinine (CR). The subjects were advised to have an overnight fast for above 12 hours, and 3 ml venous blood was collected from their forearm. Then the blood sample was determined in the clinical laboratory by oxidase method with Hitachi biochemical analyzer Labospect 008. Urine sample was kept for routine urinalysis. The determination of microalbuminuria was not included in the regular projects of this examination.

Judgment criterion for detection rate, new discovery rate, awareness rate, treatment rate and control rate of hypertension

Detection rate: the ratio of the number of the patients with hypertension and all the persons receiving the physical examination.

New discovery rate: the proportion of the number of the newly discovered patients with hypertension and the total number of the patients with hypertension.

Awareness rate: the proportion of the number of the patients who had known they had hyper-

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Table 2. Correlation analysis of hypertension grades and ages

The grade of hypertension		Age cohorts					Total
		I	II	III	IV	V	
hypertension grade 1	Case number	57	162	309	272	134	934
	Ratio	85.1%	60.2%	56.0%	49.1%	32.1%	50.2%
Hypertension grade 2	Case number	8	67	159	187	166	587
	Ratio	11.9%	24.9%	28.8%	33.8%	39.8%	31.6%
Hypertension grade 3	Case number	2	40	84	95	117	338
	Ratio	3.0%	14.9%	15.2%	17.1%	28.1%	18.2%
Total	Case number	67	269	552	554	417	1859
	Ratio	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

$\chi^2 = 111.1, P = 0.000.$

Table 3. Analysis of hypertension grades under the different ages and genders

Age groups	Male (Case number)			Female (Case number)		
	Grade 1	Grade 2	Grade 3	Grade 1	Grade 2	Grade 3
I	49	8	2	8	0	0
II	135	58	33	27	9	7
III	247	133	79	62	26	5
IV	193	137	69	79	50	26
V	75	84	46	59	82	71
Total	699	420	229	235	167	109

Male: $\chi^2 = 51.461, P = 0.000$; Female: $\chi^2 = 69.329, P = 0.000.$

tension and all the patients who were detected to have hypertension.

Treatment rate: the proportion of the number of the patients with hypertension who were receiving the treatment and all the patients with hypertension.

Control rate: the proportion of the number of the patients with hypertension in whom the blood pressure was controlled within a normal range and all the patients with hypertension.

Statistical analysis

All the data were entered into the SPSS database and were analyzed by adopting SPSS13.0 software package. The normality test was performed for all the main statistical indicators, and all the normally distributed statistical indicators were expressed as mean \pm standard deviation (SD). *t* test was adopted for the comparison between the two groups, and one-way analysis of variance was used for the comparison among multiple groups, and *q* test was employed for the pairwise comparison among multiple groups. $P < 0.05$ was considered statistically significant.

Results

Mean blood pressure of the population in the different groups

The overall mean SBP and DBP of the patients with hypertension in health examination population was SBP 158.44 ± 18.193 mmHg and 97.46 ± 11.322 mmHg, respectively. The mean SBP in men and women and the mean DBP in women showed an increasing trend with age. The difference of the mean DBP in men and women between group I and IV as well as between group V and group I, II, III was all statistically significant ($P < 0.01$). SBP and DBP in women of group III showed a decline trend, and the difference was not statistically significant (**Table 1**). From **Tables 2** and **3**, the patients with grade I hypertension accounted for the highest proportion (50.2%), and the patients with grade III hypertension accounted for the minimum proportion (18.2%). With the increase of age, the number of the male and female patients with grade III hypertension had increased significantly. Especially in the female patients aged ≥ 50 years, the number of the patients with grade II and III hypertension

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Table 4. The mean blood pressure of the hypertensive patients with different BMI

BMI	SBP (mmHg)	DBP (mmHg)
Underweight	155.50 ± 14.254	92.33 ± 7.152
Normal weight	157.79 ± 18.170	95.76 ± 10.584
Overweight	157.48 ± 17.987	97.35 ± 10.973
Obese	160.58 ± 18.475* [#]	99.15 ± 12.263* ^{#,※}
Total	158.44 ± 18.193	97.46 ± 11.322

The comparison between underweight patients and obese patients showed [※]P < 0.05; The comparison between normal weight patients and obese patients showed ^{*}P < 0.05; The comparison between overweight patients and obese patients showed [#]P < 0.05.

increased significantly, and the difference in gender was statistically significant (**Tables 2 and 3**). SBP and DBP of the patients with hypertension would rise with the increase of BMI, and the difference of SBP and DBP was statistically significant (P < 0.05) by the comparison among the obese, underweight, normal weight and overweight patients (**Table 4**).

Detection rate, awareness rate, new discovery rate, treatment rate and control rate

A total of 8852 patients were investigated, and 1859 patients were detected to have hypertension, in which, 512 patients originally with the history of hypertension and 1347 patients with newly discovered hypertension (356 patients receiving the antihypertensive medicines for treatment, and 112 patients in whom the blood pressure was controlled within the normal level). The detection rate, awareness rate, new discovery rate, treatment rate and control rate of hypertension in the health examination population of Jilin city were 21.0%, 27.5%, 72.5%, 19.1% and 6.0%, respectively.

Clinical conditions of the coexisting diseases in patients with hypertension

Hyperlipidemia was combined in 65 patients with hypertension (3.5%), coronary heart disease in 175 patients with hypertension (9.4%), atrial fibrillation in 9 patients with hypertension (0.5%), cerebral stroke in 43 patients with hypertension (2.3%), renal damage in 12 patients with hypertension (0.6%), diabetes mellitus in 121 patients with hypertension (6.5%) and hyperuricemia in 427 patients with hypertension (22.9%). 497 patients had the family history of hypertension (26.7%), and 435 patients had a history of smoking (23.4%), and

639 patients had a history of drinking (34.4%). The difference in coronary heart disease, stroke, diabetes and other comorbidities under the different hypertension grades was statistically significant (**Table 5**).

Comparison analysis of biochemical indicators and hypertensive grades from the different perspectives

In the female patients aged > 50 years, the abnormal rate of TC, TG and LDL-C were significantly higher than that in males; in the male patients aged from 30 to 49 years, the abnormal TG rate was significantly higher than that in females, and the difference was statistically significant (**Table 6**). SBP, TC, H-DLC, L-DLC and other indicators in females were higher than those in males, and DBP, CR, UA, TG and other indicators in males were higher than those in females, and the difference was statistically significant (**Table 7**). CR, FBG, TC, L-DLC and other indicators increased with the elevation of grades of hypertension, and the difference was statistically significant (**Table 8**). The obesity, overweight and abnormal TG rate in males were higher than those in females, and the abnormal L-DLC rate in females was higher than that in males, and the difference was statistically significant (**Table 9**). The number of the patients with hyperuricemia in males was significantly higher than that in females, and the difference was not statistically significant (**Table 10**).

Discussions

Hypertension is the most common cardiovascular disease and is a major public health problem over the world. Now the idea for the control of hypertension is early detection and early intervention. This study found that the mean SBP in men and women and the mean DBP in women showed an increasing trend with age. With the increase of age, the number of the male and female patients with grade III hypertension had increased significantly. Especially in the female patients aged ≥ 50 years, the number of the patients with grade II and III hypertension increased significantly. The results showed that the mean SBP and DBP in patients with hypertension showed a rising trend with the increase of BMI. The mean level of blood pressure in the obese patients and the

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Table 5. Correlation Analysis of the coexisted diseases in hypertensive patients and the different hypertensive grades

The grade of hypertension	Family history of hypertension (Case number)	Coronary disease (Case number)	Atrial fibrillation (Case number)	Stroke (Case number)	Renal damage (Case number)	Diabetes mellitus (Case number)	Hyperuricemia (Case number)
Hypertension grade 1	244	70	4	12	8	52	214
Hypertension grade 2	154	64	4	18	3	33	137
Hypertension grade 3	99	41	1	13	1	36	76
X ²	1.379	8.485	0.783	9.361	1.458	11.649	0.450
P-Values	0.502	0.014	0.676	0.009	0.482	0.003	0.799

P < 0.05 was considered statistically significant.

Table 6. Comparison of the abnormal blood lipid rate in hypertensive patients with different genders and ages

Age cohorts	Gender	TC		TG		HDL-C		LDL-C	
		Abnormal rate	P	Abnormal rate	P	Abnormal rate	P	Abnormal rate	P
I	Male	16.9	0.577	69.1	0.899	3.4	0.774	9.8	0.106
	Female	25		71.4		0.0		0.0	
II	Male	30.1	0.223	73.1	0.000	1.8	0.496	6.9	0.440
	Female	20.9		37.5		0.0		0.0	
III	Male	32	0.165	69.9	0.000	1.6	0.575	7.4	0.720
	Female	24.7		46.6		0.0		5.1	
IV	Male	29.6	0.001	66	0.001	1.5	0.698	6.5	0.064
	Female	45.2		50		0.6		13	
V	Male	29.3	0.004	47.6	0.010	1.5	1.000	3.9	0.001
	Female	42.9		60.6		1.4		17.9	

underweight patients was maximum and minimum, respectively. This result was consistent with that of the national sampling survey of the hypertension in 1991 [2], indicating that the age, gender and BMI were the important factors affecting the mean levels of hypertension. The study [3-6] showed that the increase or decrease of the body weight can cause an elevation or decline of blood pressure, meanwhile, the increase of blood pressure can also induce the elevation of body weight. This action between blood pressure and body weight was bidirectional. Overweight and obesity is not only an important risk factor for hypertension, but also a risk factor for cardiovascular and cerebrovascular diseases (e.g., coronary heart disease, stroke and CHF (congestive heart-failure)) and many chronic non-communicable diseases (e.g., diabetes and renal diseases) [7-9]. Therefore, we should highly pay attention to the

interaction between blood pressure and body weight in the prevention and control process of hypertension, strengthen the strict management of the population at high risk and susceptible population of hypertension (e.g., the obese and female population aged > 50 years) and conduct the publicity for the health education of hypertension to improve the levels of hypertension and obesity-related knowledge, to promote the scientific exercise and healthy dietary pattern and to develop a good lifestyle, thus reducing the body weight and helping the control of hypertension.

This survey found that patients with grade I hypertension accounted for the highest proportion in patients with hypertension of the health examination population, and patients with grade 3 hypertension accounted for the minimum proportion. The number of patients with

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Table 7. Comparison of the related factors in hypertensive patients with different genders

	SBP (mmHg)	DBP (mmHg)	CR (umol/L)	UA (umol/L)	FBG (mmol/L)	TC (mmol/L)	TG (mmol/L)	H-DLC (mmol/L)	L-DLC (mmol/L)
Male	156.85 ± 17.568	97.96 ± 11.307	77.049 ± 12.6781	381.25 ± 90.056	5.9569 ± 1.64242	4.9811 ± 1.00035	2.4579 ± 2.12632	1.4395 ± 0.35035	2.9866 ± 0.75682
Female	162.64 ± 19.139	96.13 ± 11.264	60.077 ± 11.6746	287.67 ± 71.001	5.7993 ± 1.40027	5.2415 ± 0.99310	1.8077 ± 1.35182	1.6106 ± 0.41526	3.1382 ± 0.76703
T-Values	5.950	3.121	27.269	21.481	1.916	5.022	7.549	8.267	2.688
P-Values	0.000	0.002	0.000	0.000	0.056	0.000	0.000	0.000	0.007

Table 8. Comparison of biochemical indicators in patients with different hypertensive grades

The grade of hypertension	CR (umol/L)	UA (umol/L)	FBG (mmol/L)	TC (mmol/L)	TG (mmol/L)	H-DLC (mmol/L)	L-DLC (mmol/L)
Hypertension grade 1	71.653 ± 14.0132*	357.86 ± 92.595	5.7520 ± 1.43882*	4.9458 ± 0.99825*	2.2073 ± 1.88269	1.4884 ± 0.37755	2.9603 ± 0.72585*
Hypertension grade 2	72.622 ± 13.7435	357.75 ± 96.067	5.9826 ± 1.63822*	5.1302 ± 0.99850	2.3148 ± 2.01196	1.4813 ± 0.39972	3.0698 ± 0.81184
Hypertension grade 3	74.006 ± 17.0093	354.77 ± 98.842	6.2421 ± 1.78662*	5.2133 ± 1.00322*	2.3588 ± 2.05175	1.4903 ± 0.33351	3.0826 ± 0.75602
P-Values	0.035	0.881	0.000	0.000	0.406	0.920	0.036

P < 0.05 was considered statistically significant. The comparison between grade I hypertension and grade II showed *P < 0.05; The comparison between grade I hypertension and grade III showed *P < 0.05; The comparison between grade I hypertension and grade III showed *P < 0.05.

grade I and II hypertension accounted for 81.8% of the total number of patients with hypertension, indicating that patients with mild to moderate hypertension was in majority in patients with hypertension of health examination population. The study results showed that the detection rate of hypertension, awareness rate, new discovery rate, treatment rate and control rate were 21.0%, 27.5%, 72.5%, 19.1% and 6.0%, respectively, in health examination population in Jilin city, all of which were significantly lower than the national level in 2002 [10]. The awareness rate, treatment rate and control rate of hypertension in the whole country in 2002 was 37.6%, 32.2% and 7.6%. The results from the survey showed that a larger gap still existed compared to the developed countries (e.g., United States). The awareness rate, treatment rate and control rate of hypertension in United States was 75%, 59% and 34% [11, 12]. Therefore, the hypertension in the health examination population of Jilin City had the features of the high incidence and the awareness rate, treatment rate and control rate which were lower than those at home and abroad. Through analysis, the reasons may be related to the following factors: younger patients receiving the physical examination, asymptomatic hypertension, paying no attention to the health knowledge, insufficient publicity of the health education for hypertension,

inaccurate guidance, unprofessional treatment of hypertension, lack of long-term medication and optional withdrawal in patients. The above content highlighted the importance of physical examination, and the prevention and control task of hypertension are still very arduous.

The results from the survey show that the difference in coronary heart disease, stroke and other target organs lesions as well as hyperlipidemia, diabetes and other coexisting diseases among the different hypertension grades was statistically significant. The survey showed that the abnormal TC rate, abnormal TG rate and abnormal LDL-C rate in the female hypertensive patients at the age of > 50 years were all significantly higher than those in male, and the abnormal TG rate in the male hypertensive patients at the age of 30~49 years was significantly higher than that in female, with a statistical difference. TC, L-DLC and other indicators increased with the rise of the hypertension grades, which was consistent with the results of the recent clinical and epidemiological studies that showed the level of blood cholesterol was positively correlated with the blood pressure level [13]. The study found that the lipid lowering therapy could affect the blood pressure of the patients. Ferrier et al [14] found that the intensive lipid-lowering therapy is beneficial to the treatment of the hypertensive patients.

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Table 9. Prevalence rate of metabolic diseases in hypertensive patients with different genders (%)

Items	Number of male patients (%)	Number of female patients (%)	Total	χ^2	P
Overweight	47.7	41.7	46.0	5.40	0.02
Obese	32.0	21.3	29.0	44.123	0.000
FBG abnormality	6.1	7.6	6.5	1.461	0.227
TC	29.9	38.2	32.2	0.100	0.752
TG abnormality	65.8	53.1	57.0	64.740	0.000
LDL-c abnormality	6.7	11.2	4.8	5.469	0.019
HDL-c abnormality	1.6	0.8	1.3	1.678	0.195

Table 10. Relationship between the hypertension and hyperuricemia with gender

The grade of hypertension	Male(Case number)		Female(Case number)	
	Blood uric acid increase group	Blood uric acid normal group	Blood uric acid increase group	Blood uric acid normal group
Hypertension grade 1	191	432	23	163
Hypertension grade 2	112	260	25	103
Hypertension grade 3	64	138	12	87
Total	367	830	60	353

Male: no difference was found among the groups ($\chi^2 = 0.153$, $P = 0.926$); Female: no difference was found among the groups ($\chi^2 = 3.743$, $P = 0.154$).

Therefore, in the prevention and control of hypertension, we should strengthen the strict management of the patients with hyperlipidemia, female patients aged > 50 years and those at high risk and susceptible population of hypertension, conduct the publicity for the health education of hypertension to improve the knowledge levels of the prevention and control of hypertension and hyperlipidemia, and advocate a healthy lifestyle and normalized treatment of hyperlipidemia to control blood lipids, which is not only beneficial to the control of hypertension, but also helps the comprehensive prevention and control of cardiovascular and other chronic diseases.

This survey found that 427 patients (22.9%) had hypertension combined with hyperuricemia. The mean uric acid level in male hypertensive patients was higher than that in female hypertensive patients ($P < 0.01$). Hyperuricemia is a risk factor that can not be ignored for hypertension [15]. The agedness and male are the two uncontrollable factors resulting in an increase of uric acid, and estrogen can promote the uric acid excretion, therefore, the male or elderly women are prone to having increased uric acid. Blood uric acid > 357 $\mu\text{mol/L}$ (6 mg/dl) is an independent risk factor for coronary

heart disease, and blood uric acid > 416.5 $\mu\text{mol/L}$ (7 mg/dl) is an independent risk factor for stroke [16-18]. Therefore, we should pay great attention to the effect of blood uric acid in the development and progression of hypertension and cardiovascular diseases clinically. It is recommended that the uric acid test should be taken as a routine test for diagnosis of these diseases in order to timely detects hyperuricemia [19], and control and adjust the level of blood uric acid, thus preventing and treating hypertension and cerebrovascular diseases. The study [20] showed that folic acid, vitamin B12 and vitamin B6 can effectively reduce the blood uric acid level in mice with hyperuricemia in a dose-dependent manner. The damage of hyperuricemia to vascular endothelial cell function manifested as the decrease of serum NO level, and this decrease can be effectively reversed by the larger dose of folic acid and other B vitamins. Folic acid, vitamin B12 and vitamin B6 can inhibit the expression of the nuclear factor NF-KB. Therefore, for the treatment of the hypertensive patients with hyperuricemia, the auxiliary treatment of folic acid, vitamin B12 and vitamin B6 combined with antihypertensive medication would have a better control of blood uric acid level to prevent the occurrence of complications and play a supplementary role in controlling the blood pressure.

The damage of hypertension is not only related to the blood pressure levels of the patients, but also depends to other simultaneous cardiovascular disease risk factors and the incorporated clinical diseases. However, in the clinical practice, the vast majority of patients and quite a number of medical personnel have a awareness of hypertension which is only limited to the blood pressure itself, ignoring the combined risk factors, existing target organs damage and other combined clinical diseases and failing to comprehensively assess the overall situation, thus failing to make a targeted treatment. Hypertension, dyslipidemia, hyperglycemia and other diseases may cause a serious vascular damage, but the early symptoms are not obvious and can easily be overlooked. Therefore, the early health examination is conducive to early detection, early prevention and early treatment. The comprehensive prevention and control for hypertension, coronary heart disease, diabetes, stroke, hyperuricemia, dyslipidemia and other chronic diseases will be one of the priorities of tasks in the physical examination center to really provide a guidance and other effects in screening of hypertension, systematic testing of risk factors and damage to targeted organs, health education for hypertensive patients and standardizing the clinical treatment. Therefore, it is suggested that a standard prevention and control system of hypertension should be established, and the examination of hypertension is developed into a set of required examination item, thus having a comprehensive control of risk factors and target organs damage to help the treatment and management of hypertensive patients. Moreover, it is urgently required to conduct the health education of hypertension-related diseases, thereby, vigorously advocating the health lifestyle such as smoking cessation, less drinking, rational diet, relaxing your mind and moderate exercise to reduce the incidence, disability rate and mortality of hypertension, dyslipidemia, diabetes and other chronic vascular diseases.

The results from this survey show that the proportion of the combination of diabetes, cerebrovascular accident and heart diseases in hypertensive population is lower, which may be associated with younger age and in-service condition of the patients, indicating that we should attach great importance to the primary

prevention of hypertension to achieve early detection, early treatment and early control. The physical examination center is always the first stop for the detection hypertension, so it should be combined with the clinical practice to establish an improved medical protection system and follow-up system strengthen the prevention and treatment awareness for hypertension and conduct the publicity of health education for the hypertensive patients. Moreover, we should also establish a complete health file about hypertension in residents to help improve the understanding of hypertension, control the relevant risk factors, carry out a normalized treatment in the hypertension patients and enhance the medication compliance in patients, thus improving the treatment rate and control rate of hypertension, reducing the damage to target organs and clinical events and improving the prognosis. The patients with grade I and II hypertension are the key for prevention and control.

Disclosure of conflict of interest

None.

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