

Research Article

A Survey on the Current Prevalence of Hypertension in Company Employees

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Abstract

Objective To perform a survey on the current prevalence of hypertension in company employees, so as to improve the awareness rate, treatment rate, and control rate of hypertension, and also to provide theoretical basis for health promotion for all employees. **Methods** A total of 1762 employees from a company in Wuhu participated in this study. Parameters including height, body mass, blood pressure, blood lipid, blood glucose, and uric acid were measured. Data were collected and statistically analyzed. **Results** Among the 1762 employees, 629 had hypertension with an overall prevalence rate of 35.70%. The prevalence of hypertension was significantly higher in males than that in females (39.43% vs. 29.17%, $P < 0.05$). And the prevalence rate of hypertension increased with age in both genders. The overall awareness rate, treatment rate, and control rate of hypertension were 69.95%, 56.44% and 29.73%, respectively; these rate were generally lower in males (69.46%, 53.17% and 28.73%) compared with those in females (71.12%, 64.17% and 32.09%), and the difference in treatment rate was statistically significant between males and females ($P < 0.05$). Based on the diagnostic criteria of hypertension, participants were divided into the hypertension group ($n=629$) and the normotension group ($n=1133$). The mean age, SBP, DBP, heart rate, body mass index, rate of alcohol use, as well as the detection rates of hypercholesterolemia, hypertriglyceridemia, hyperglycemia, and hyperuricemia in the hypertension group were significantly higher than those in the normotension group (all $P < 0.05$). **Conclusion** The prevalence rate of hypertension is high, and the awareness rate, treatment rate, and control rate of hypertension are generally low in company employees. It is important to strengthen health education and health knowledge promotion among employees, raise their awareness of hypertension prevention and treatment, and urge them to change their unhealthy eating habit and lifestyle, which may contribute to health promotion for all.

Keywords

Hypertension, Awareness Rate, Treatment Rate, Control Rate

1. Objects and Methods

1.1. Objects

A random sampling method was adopted to select 1,762 employees of a certain company in Wuhu as the research subjects. Among the study subjects, there were 1,121 males and 641 females. The average age of the study subjects was (50.51

± 13.78) years, among which the average age of males was (50.02 ± 14.18) years and that of females was (51.36 ± 13.02) years. The research subjects included 46 cases (41 males and 5 females) under 30 years old, 351 cases (252 males and 99 females) aged 30 to 39 years old, 625 cases (370 males and 25 females) aged 40 to 49 years old, 287 cases (172 males and

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115 females) aged 50 to 59 years old, and 453 cases over 60 years old (286 males and 167 females).

1.2. Methods

In 2014, the height, body weight and blood pressure of all the research subjects were measured. At the same time, empty abdominal resting pulse blood was drawn for blood lipid, blood glucose and uric acid tests, and the obtained data were statistically analyzed.

1.3. Diagnostic Criteria

1.3.1. Overweight and Obesity

According to the diagnostic criteria in the "Guidelines for the Prevention and Control of Overweight and Obesity in Chinese Adults" [1], the body mass index (BMI) is classified. A BMI < 18.5 kg/m² is considered underweight, and a BMI between 18.5~< 24 kg/m² is considered normal. A BMI of 24~< 28 kg/m² is considered overweight, and a BMI of ≥ 28 kg/m² is considered obesity.

1.3.2. Hypertension

According to the diagnostic criteria in the "Chinese Hypertension Prevention and Treatment Guidelines 2010" [2], individuals with normal blood pressure who have a systolic blood pressure (SBP) of ≥140 mmHg (1 mmHg = 0.133 kPa) and/or a diastolic blood pressure (DBP) of ≥90 mmHg or have taken antihypertensive drugs in the past two weeks are defined as having hypertension.

1.3.3. Hyperglycemia

According to the diagnostic criteria in the "Chinese Guidelines for the Prevention and Treatment of Type 2 Diabetes Mellitus (2010 Edition)" [3], impaired fasting plasma glucose (IFG): fasting plasma glucose (FPG) 6.1 - < 7.0 mmol/L; Diabetes mellitus (DM): FPG ≥ 7.0 mmol/L and/or previous history of diabetes mellitus. This study defines the above two situations as hyperglycemia.

1.3.4. Dyslipidemia

According to the diagnostic criteria in the Chinese Guidelines for the Prevention and Treatment of Dyslipidemia in Adults (2007) [4], hypercholesterolemia (TC): TC ≥ 6.22 mmol/L; Hypertriglyceridemia (TG): TG ≥ 2.26 mmol/L; High and low density lipoproteinemia (LDL-C): LDL-C ≥ 4.14 mmol/L; Hypohyperdensity lipoprotein cholinolidemia (HDL-C): HDL-C ≤ 1.04 mmol/L.

1.3.5. Hyperuricemia

According to relevant standards [5] this study defined hyperuricemia as uric acid (UA) > 420 μmol/L.

1.4. Definitions of Relevant Indicators in Epidemiological Investigations

1.4.1. Awareness Rate, Treatment Rate and Control Rate of Hypertension

Awareness rate of hypertension: The proportion of research subjects who could be diagnosed with hypertension and knew they had hypertension before this study. Hypertension treatment rate: The proportion of research subjects who can be diagnosed with hypertension and have taken antihypertensive drugs in the past two weeks. Hypertension control rate: The proportion of research subjects who can be diagnosed with hypertension and currently have their blood pressure controlled below 140/90 mmHg through treatment [6].

1.4.2. Smoking and Drinking

In this study, "smoking" was defined as an individual smoking at least one cigarette per day for one year. "Drinking alcohol" is defined as an individual consuming at least 50 g of alcohol per day and more than four times a week.

1.5. Statistical Methods

All data were statistically analyzed using SPSS17.0 software. Measurement data were analyzed by t-test, and count data were analyzed by χ^2 test. A P value < 0.05 was considered statistically significant.

2. Result

2.1. The Prevalence of Hypertension Among Company Employees of Different Age Groups and Genders

Among 1,762 company employees, there were 629 patients with hypertension, with a prevalence rate of 35.70%. Among the patients with hyperhypotension, there were 442 male cases (39.43%) and 187 female cases (29.17%). The incidence of hyperhypotension in the 30-39 age group, the 40-49 age group and overall male employees was higher than that in female employees, and the differences were statistically significant (P < 0.05). Regardless of gender, the incidence of hypertension among company employees increases with age. The prevalence of hypertension is the highest among employees over 60 years old (63.36%), reaching 65.03% for males and 60.48% for females (Table 1).

2.2. Comparison of SBP, DBP, Heart Rate and BMI Among Company Employees of Different Genders

The SBP of the company's employees was (123.14 ± 17.88) mmHg, and the DBP was (78.41 ± 10.60) mmHg. The SBP of

male employees was (124.23 ± 18.11) mmHg, and the DBP was (79.98 ± 10.81) mmHg. The SBP of female employees was (121.23 ± 17.31) mmHg, and the DBP was (75.67 ± 9.65)

mmHg. Moreover, the SBP, DBP and BMI of male employees were all higher than those of female employees, and the differences were statistically significant ($P < 0.05$) (Table 2).

Table 1. The prevalence of hypertension among company employees of different age groups and genders.

Age (years)	Male		Female		Total	
	Case	Prevalence rate (%)	Case	Prevalence rate (%)	Case	Prevalence rate (%)
<30	3	7.32	0	0.00	3	6.52
30~39	52	20.63	5	5.05	57	16.24
40~49	112	30.27	34	13.33	146	23.36
50~59	89	51.74	47	40.87	136	47.39
>60	186	65.03	101	60.48	287	63.36
Total	442	39.43	187	29.17	629	35.70

a: Compared with men of the same age group, $P < 0.05$.

Table 2. Comparison of SBP, DBP, heart rate and BMI among company employees of different genders ($\bar{x} \pm s$).

Gender	SBP (mmHg)	DBP (mmHg)	Heart rate (beats/min)	BMI (kg/m^2)
Male (n=1121)	124.23 ± 18.11	79.98 ± 10.81	75.59 ± 9.26	24.70 ± 3.07
Female (n=641)	121.23 ± 17.31^a	75.67 ± 9.65^a	75.93 ± 9.11	23.41 ± 3.49^a

a: Compared with men, $P < 0.05$.

2.3. The Levels of SBP and DBP Among Company Employees of Different Age Groups and Genders

Table 3. The levels of SBP and DBP among company employees of different age groups and genders ($\bar{x} \pm s$).

Age (years)	Male		Female	
	SBP (mmHg)	DBP (mmHg)	SBP (mmHg)	DBP (mmHg)
<30	116.51 ± 10.45	77.93 ± 6.95	108.00 ± 8.37	72.00 ± 7.58
30~39	118.57 ± 15.37	78.56 ± 10.30	111.57 ± 10.75	71.87 ± 7.80
40~49	120.64 ± 15.08	80.22 ± 10.97	115.89 ± 14.39	74.98 ± 9.28
50~59	125.36 ± 17.40	82.16 ± 11.39	125.17 ± 19.15	78.87 ± 10.78
>60	134.29 ± 20.82	79.91 ± 10.95	132.79 ± 16.34	76.87 ± 9.59

With the increase of age, the SBP levels of employees of different genders in companies also increase. SBP reaches its peak in the age group over 60, while the DBP of male and

female company employees reaches its peak in the age group of 50 to 59, and then decreases (Table 3).

2.4. The Awareness Rate, Treatment Rate and Control Rate of Hypertension Among the Company's Employees

In this study, the awareness rate, treatment rate and control rate of hypertension among the company's employees were 69.95% (440/629), 56.44% (355/629) and 29.73% (187/629) respectively. Among them, the awareness rate, treatment rate and control rate of hypertension among male employees were 69.46% (307/442), 53.17% (235/442) and 28.73% (127/442) respectively. The rates for female employees were 71.12% (133/187), 64.17% (120/187), and 32.09% (60/187) respectively. Moreover, there was a statistically significant difference in the treatment rate of hypertension between male and female employees ($P < 0.05$).

2.5. Comparison of Clinical Data of Company Employees in the Normal Blood Pressure Group and the Hypertension Group

According to the diagnostic criteria for hypertension, the company's employees were divided into the hypertension group and the normal blood pressure group. Among them, there were 629 employees in the hypertension group and 1,133 employees in the normal blood pressure group. The age, SBP level, DBP level, heart rate, BMI, detection rate of hyperTC syndrome, detection rate of hyperTG syndrome, detection rate of hyperglycemia, detection rate of hyperuricemia and alcohol consumption rate of company employees in the hyperglycemic blood pressure group were all higher than those in the normal blood pressure group, and the differences were statistically significant ($P < 0.05$) (Tables 4 and 5).

Table 4. Comparison of age, blood pressure, heart rate and BMI of company employees in the normal blood pressure group and the hypertension group ($\bar{x} \pm s$).

Group	Age (years)	SBP (mmHg)	DBP (mmHg)	Heart rate (beats/min)	BMI (kg/m ²)
Normal blood pressure group (n=1133)	46.37 $\pm$ 11.72	114.64 $\pm$ 11.11	74.37 $\pm$ 7.70	74.58 $\pm$ 8.45	23.62 $\pm$ 3.18
Hypertension group (n=629)	57.97 $\pm$ 14.08 ^a	138.44 $\pm$ 17.58 ^a	85.69 $\pm$ 11.22 ^a	77.75 $\pm$ 10.11 ^a	25.34 $\pm$ 3.19 ^a

a: Compared with the normal blood pressure group, $P < 0.05$.

Table 5. Comparison of dyslipidemia, hyperglycemia, hyperuricemia, smoking and drinking among company employees in the normal blood pressure group and the hypertension group [n (%)].

Group	Hypertri-glyceridemia	Hypertc syndrome	High "LDL-C" Blood disorder	Low "HDL-C" Blood lipid	Hypergly-cemia	Hyperu-ricemia	Smoking rate	Drinking rate
Normal blood pressure group (n=1133)	96 (8.47)	172 (15.18)	206 (18.18)	11 (0.97)	129 (11.39)	96 (8.47)	353 (31.16)	349 (30.80)
Hypertension group (n=629)	74 (11.76) ^a	164 (26.07) ^a	133 (21.14)	8 (1.27)	227 (36.09) ^a	86 (13.67) ^a	196 (31.16)	228 (36.25) ^a

a: Compared with the normal blood pressure group, $P < 0.05$.

2.6. Comparison of SBP and DBP Between Normal Blood Pressure and Hypertension Employees of Different Age Groups

With the increase of age, the SBP of company employees in both the normal blood pressure group and the high blood pressure group reached the highest value in the stage of age > 60 years old, and the SBP of company employees in the age >

60 years old was higher than that of company employees in the age group of 50-59 years old, and the difference was statistically significant ($P < 0.05$). The DBP of the company employees in the normal blood pressure group reached its peak in the age group of 50-59 years old and then decreased. The levels of SBP and DBP in the high blood pressure group of company employees in the same age group were both higher than those in the normal blood pressure group, and the differences were statistically significant ($P < 0.05$) (Table 6).

2.7. Comparison of SBP and DBP Between Normal Blood Pressure and Hypertension Employees of Different BMI Grades

As the BMI grade increased from thin to obese, the SBP and DBP levels of the company employees in the normal

blood pressure group also gradually increased. The SBP and DBP levels of company employees in the same BMI grade hypertension group were both higher than those in the normal blood pressure group, and the differences were statistically significant ($P < 0.05$) (Table 7).

Table 6. Comparison of SBP and DBP levels between the normal blood pressure group and the hypertension group of company employees in different age groups ($\bar{x} \pm s$).

Age (years)	Normal blood pressure group (n=1133)		Blood pressure group (n=629)	
	SBP (mmHg)	DBP (mmHg)	SBP (mmHg)	DBP (mmHg)
<30	114.77 $\pm$ 10.33	76.30 $\pm$ 6.32	127.33 $\pm$ 4.62 ^a	91.33 $\pm$ 2.31 ^a
30~39	112.75 $\pm$ 10.10	73.97 $\pm$ 7.74	136.40 $\pm$ 17.70 ^a	90.63 $\pm$ 9.41 ^a
40~49	113.51 $\pm$ 10.72	74.38 $\pm$ 7.94	135.74 $\pm$ 14.33 ^a	90.25 $\pm$ 9.15 ^a
50~59	115.10 $\pm$ 11.72	74.99 $\pm$ 7.54	136.59 $\pm$ 17.19 ^a	87.34 $\pm$ 11.13 ^a
>60	120.81 $\pm$ 11.48 ^b	74.00 $\pm$ 7.34	141.21 $\pm$ 18.94 ^{ab}	81.56 $\pm$ 11.14 ^a

a: Compared with the normal blood pressure group, $P < 0.05$;

b: Compared with the age group of 50 to 59, $P < 0.05$.

Table 7. Comparison of SBP and DBP levels between the normal blood pressure group and the hypertension group of company employees with different BMI grades ($\bar{x} \pm s$).

BMI grade	Normal blood pressure group (n=1133)		Hypertension group (n=629)	
	SBP (mmHg)	DBP (mmHg)	SBP (mmHg)	DBP (mmHg)
Emaciated	110.13 $\pm$ 12.23	73.39 $\pm$ 8.02	149.75 $\pm$ 21.11 ^c	82.25 $\pm$ 14.63 ^c
Normal	112.82 $\pm$ 11.04	72.77 $\pm$ 7.72	139.37 $\pm$ 16.89 ^{ac}	84.76 $\pm$ 10.55 ^c
Overweight	117.02 $\pm$ 10.59 ^{ab}	76.37 $\pm$ 7.30 ^b	137.86 $\pm$ 17.80 ^{ac}	86.58 $\pm$ 11.52 ^c
Obesity	117.95 $\pm$ 10.85 ^{ab}	76.93 $\pm$ 6.36 ^{ab}	137.15 $\pm$ 17.51 ^{ac}	85.19 $\pm$ 11.03 ^c

a: Compared with emaciation, $P < 0.05$; b: Compared with normal, $P < 0.05$; c: Compared with the normal blood pressure group of the same BMI grade, $P < 0.05$.

3. Discussion

Hypertension is a common and serious disease that seriously endangers human health. With the progress of society, the acceleration of the pace of life and the improvement of living standards, people's living habits and dietary patterns have undergone tremendous changes. Hypertension is closely related to an individual's dietary structure and living habits. This study conducted a research on the current prevalence of hypertension among employees of a certain company and explored the related influencing factors, with the aim of im-

proving the treatment rate, control rate of hypertension among the majority of employees in enterprises and the awareness rate of hypertension among employees. Correctly guiding patients with high blood pressure to undergo regular blood pressure monitoring and effective treatment can reduce the occurrence of complications such as stroke and coronary heart disease in patients with high blood pressure, providing a theoretical basis for safeguarding the physical and mental health of the majority of enterprise employees.

The results of this study show that the prevalence of hyperhypotension among employees of different genders in companies increases with age. The prevalence of hyperhy-

potension among male employees is higher than that among female employees ($P < 0.05$). This phenomenon is particularly prominent among company employees aged 30 to 49, which is consistent with the research results of Ruan Danjie et al [7]. This might be related to the fact that middle-aged and young male employees are under great work pressure, have many social engagements, enjoy smoking and drinking, have less rest time and lack exercise. Among company employees over 50 years old, although the prevalence of hypertension among men is still higher than that among women, the difference is not statistically significant. This indicates that as women age, the protective effect of estrogen on their bodies gradually decreases. Therefore, the prevalence of hypertension among women in this age group increases rapidly. This further leads to a decreasing difference in the prevalence of hypertension between men and women [8]. The prevalence of hypertension among employees over 60 years old reached the highest value, further indicating that age is an important risk factor for the occurrence of hypertension, which is consistent with the research results of Liu Yulian, Li Zhichao, et al [9, 10].

Furthermore, with the increase of age, the SBP levels of company employees all rise, and their DBP reaches the highest value in the age group of 50-59 years old, which is consistent with the research results of Zhang Hongyu et al [11]. It is indicated that as age increases, the degree of arteriosclerosis gradually worsens in both men and women, the elasticity of blood vessels deteriorates, and the pulse pressure difference also increases. Therefore, both male and female employees should pay attention to cultivating healthy eating habits, follow a low-fat and low-salt diet, participate in appropriate physical exercise, and actively undergo drug treatment to prevent the further aggravation of arteriosclerosis. Meanwhile, company employees should also pay attention to keeping warm in winter to prevent cerebrovascular accidents caused by arteriosclerosis [12].

The results of this study also show that there were a total of 629 hypertensive patients among the company's employees, and the prevalence rate of hypertension was 35.70%, which was higher than the research results of Yi Yanjing et al [13] on hypertension among the middle-aged and elderly population in the Chengdu area. The awareness rate, treatment rate and control rate of hypertension among the company's employees were 69.95%, 56.44% and 29.73% respectively, all higher than the research results conducted by Shao Yongqiang et al [14] in previous years. This might be related to the improvement of the living standards of the majority of employees in recent years, the enhancement of the medical insurance system, the strengthening of the health awareness dissemination capabilities of medical workers, as well as the increase in the knowledge level and health awareness of employees. However, compared with the results of the National Population Nutrition and Health Survey in the United States from 1998 to 2008 (the awareness rate, treatment rate and control rate of hypertension were 80.7%, 72.5% and 50.1%

respectively), there is still a considerable gap in the results of this study [15]. In addition, the awareness rate, treatment rate and control rate of hypertension among men were 69.46%, 53.17% and 28.73% respectively, while those among women were 71.12%, 64.17% and 32.09% respectively. The awareness rate, treatment rate and control rate of hypertension in men are all lower than those in women. Moreover, there is a statistically significant difference in the treatment rate of hypertension between men and women, indicating that women pay more attention to their own physical health and can actively cooperate with doctors for treatment.

According to the diagnostic criteria for hypertension, the company's employees were divided into the normal blood pressure group and the hypertension group, and the clinical data of the company's employees in the two groups were compared. It was found that there were statistically significant differences between the two groups of employees in terms of age, SBP level, DBP level, heart rate, BMI, detection rate of hyperTC syndrome, detection rate of hyperTG syndrome, detection rate of hyperglycemia, detection rate of hyperuricemia and alcohol consumption rate. The research results also showed that as the BMI grade increased from underweight to obesity, the levels of SBP and DBP in the normal blood pressure group of employees gradually rose, indicating that in addition to age being a clear risk factor for hypertension, high resting heart rate, overweight and obesity, high cholesterol, high triglycerides, high blood sugar, high uric acid and alcohol consumption may all have certain influences on the occurrence of hypertension in individuals [16, 17].

4. Conclusion

In conclusion, there is a high prevalence rate, low awareness rate, low treatment rate and low control rate of hypertension among the company's employees. It is necessary to further strengthen health education and health knowledge dissemination for employees to enhance their awareness of hypertension prevention and treatment. At the same time, it is necessary to supervise and urge employees to change their bad eating habits and unhealthy lifestyles, so as to achieve the goal of improving the health level of the majority of employees.

Abbreviations

BMI	Body Mass Index
SBP	Systolic Blood Pressure
DBP	Diastolic Blood Pressure
LDL-C	Low-Density Lipoprotein Cholesterol
HDL-C	High-Density Lipoprotein Cholesterol

Author Contributions

Zhang Lianhua is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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