

Blood Pressure Control in Hypertensive Patients, Iran: A Cross-Sectional Study

Shahab Rezaeian ^{*}, Jamal Ahmadzadeh

Department of Epidemiology & Biostatistics, School of Public Health, Hamadan University of Medical Sciences, Hamadan, Iran

*** Corresponding Author:** Shahab Rezaeian

Department of Epidemiology & Biostatistics, School of Public Health, Hamadan University of Medical Sciences, Shaheed Fahmideh Ave. Hamadan 65157838695, Iran,
Email: shahab_fs@yahoo.com

Abstract

Background: The poor control of blood pressure is one of the prevalent problems for primary health care services all over the world.

Objective: The objective of this study was to evaluate blood pressure control in hypertensive patients.

Method: We conducted a cross-sectional study that included 579 subjects representative of the hypertensive patient's population in Sarvabad city, the west of Iran in 2011. This information was extracted from the family records. Adequate blood pressure control was defined as <140/90 mmHg.

Results: The mean age was 65.8 years [95% CI: 64.8, 66.8], 38.7% were male, 9.8% were smokers and 18.3% were obese. Overall, 40% [95% CI: 35.9%, 44.1%] of hypertensive patients had their blood pressure controlled; the age-specific blood pressure control rate was 61.5%, 46.4% and 35.3% in men and 45.2%, 34% and 38.2% in women age 28 to 50 years, 51 to 70 years and above 71 years, respectively.

After adjustment the likelihood of having poor control was 0.36 times greater among the diabetic patients, 0.52 times greater among the patients who had a BMI ≥ 30 that these were significant.

Conclusion: In all, BP control rate was low (40%). These results suggest that the majority of the treated hypertensive patients are complicated with additional cardiovascular risk factors such as smoking and obesity therefore required a good management of BP control.

Key words: Blood pressure control, Hypertensive patients, Propensity score, Iran

Introduction

However, in late decades it has been characterized that only a small proportion of patients on antihypertensive medication have well controlled blood pressure (BP)¹⁻³, but it is one of the prevalent problems for primary health care (PHC) services all over the world, nowadays.⁴⁻⁷

The direct reasons for this global epidemic of bad controlled BP are not well understood, but it seems that the barriers for adequate control of BP are complex and arise from a combination of factors related to patients, physicians and health systems.⁸

Hypertension is one of the common, powerful, and independent risk factor for cardiovascular disease.⁹⁻¹¹ Blood pressure control is one of the effective ways to prevention of CVD.¹²

The objective of our present study was to clarify the proportion of hypertensive patients on treatment and follow-up at the PHC settings whose BP was well controlled in the Sarvabad city.

Material & Methods

A cross sectional study was conducted in 2011 using a retrospective data collection of hypertensive patients who were treated in the nine PHC centers in Sarvabad city, the west of Iran.

A mount of 2,500 patients were registered as hypertensive patients ($BP \geq 140/90$ mmHg) and were under-follow up in these nine PHC centers. A hypertensive patient usually attends the clinic every one to three months for follow-up and on monthly basis for a repeat prescription.

All hypertensive patients, who had made at least three previous PHC visits, were living in their current address at least for one year and had been on antihypertensive medications for at least one year, were included.

A sample of 700 family records of hypertensive patients was selected using cluster sampling. To account for the inclusion criteria, a total of 579 patients were then participated in the study (participation rate, 82.7%).

This information was extracted from the family records including: age, sex, weight, height, smoking status, duration time of diagnosis, number of previous PHC visits. Body mass index (BMI) was calculated as weight in kilograms divided by the height in meters square (kg/m^2) and obesity was defined $\geq 30 \text{ kg/m}^2$.

The mean of these PHC visits was used for the statistical analyses, and controlled BP was defined as $BP \leq 140/90$ mmHg¹³, which was the therapeutic target in individuals with high blood pressure at the time of the survey.

All statistical analyses were performed using STATA 11.0 (StataCorp, College Station, TX, USA) software. Data are presented as mean \pm SD for continuous variables with normal distribution and as proportions for categorical variables. Unpaired student's t test was used to determine the differences between the two groups. We used Chi-square test for categorical

comparison of data. We also to cope with potential confounding variables, a propensity analysis performed using a logistic regression approach that was based on all available baseline variables.¹⁴ Statistical significance was established at $P < 0.05$.

Results

A total of 579 family records of hypertensive patients were enrolled. The mean age was 65.8 years [95% CI: 64.8, 66.8], 38.7% were male, 9.8% were smokers and 18.3% were obese. Patient ages were distributed in the following manner: 10.0% were younger than 50 years, 50.4% were aged 51 to 70 years, and 39.6% were 71 years or older. In 59.7% of patients, hypertension had been diagnosed more than 5 years earlier. Demographic and clinical characteristics of the patients in the study were reported in Table 1.

Overall, 40% [95% CI: 35.9%, 44.1%] of hypertensive patients had their blood pressure controlled; and good control of only SBP in 28.4% [95% CI: 24.6%, 32.1%], and only DBP in 70.3% [95% CI: 66.5%, 74.1%]. Interestingly, 43.7% of obese patients had controlled BP [95% CI: 43.0%, 53.3%]. The age-specific blood pressure control rate was 61.5%, 46.4% and 35.3% in men and 45.2%, 34% and 38.2% in women age 28 to 50 years, 51 to 70 years and above 71 years, respectively.

The absence of blood pressure control was more pronounced among smokers than in nonsmokers for systolic (84.2% vs. 57.2%), ($P < 0.001$) and diastolic (29.8% vs. 20.9%), ($P = 0.13$) pressures. We also observed that high percentages of controlled patients in women (31.2%) than men (24.0%) but it was not significantly, ($P = 0.06$).

We also calculated the unadjusted and adjusted odds ratio in order to find the confounding variables. The likelihood of having poor control was 0.36 times greater among the diabetic patients, 0.52 times greater among the patients who had a BMI ≥ 30 that these were significant (Table 2).

Discussion

The results of our study showed that in hypertensive patients, inadequate control of BP was high. The BP control rate found in our study (40%) was similar to that reported in the Persian Gulf region^{4, 15-16} and other regions.^{6, 17-18} However, In the Zheng study¹⁹, 1.0% of hypertensive patients were controlled to goal level.

Uncontrolled BP can potentially make a significant impact on the morbidity and mortality associated with cardiovascular disease, stroke and other hypertension-related diseases.¹¹⁻¹² As stated in Rezaeian et al study on other groups in the same population that the prevalence of cardiovascular risk factor such as diabetes, hypertension, smoking, obesity and family history of cardiovascular disease are high.²⁰

Various characteristics of patient have been associated with uncontrolled BP, including age²¹⁻²², obesity^{5, 23-24} and smoking²⁴. These characteristics are risk factors for hypertension itself and presumably contribute directly to difficult blood pressure control. Age is one of the most effective factors related to hypertension accounts for the vast majority of cases of uncontrolled BP in patients with above 70 years of age.²⁵ As expected, in the present study rate of BP control decreased with age, as in other studies¹⁸⁻¹⁹, the rate of controlled BP also decreased with age and indicates different levels of BP control in different age groups.

Data on the relation of gender with BP control has been conflicting. In this study, rate of control among hypertensive patients had no significant difference between women and men. This result was similar to previous studies.⁵ However, In the PRESCAP study²⁶, there were appreciable differences between women and men in BP control.

Cigarette smoking is one of the leading causes of preventable death that increases the risk of hypertension and CVD disease. Although, the smoking rates in developing countries are steeply increasing, and the prevalence of smoking among Asian males is excessive, for example India (45%), Japan (53%), China (63%), Indonesia (69%) and Iran (23.2%).²⁷⁻²⁸ Because of these reasons, the prevalence of smoking is very dangerous in hypertensive patients. Our result for prevalence of smoking among hypertensive patients is generally consistent with other studies.^{24, 29-30}

Several limitations of this study deserve mention. First of all, the cross-sectional study limited our ability to infer a causal relationship between BP control status and other variables. Secondly, though we attempted to eliminate the influence of confounding factors on our study, but the existence of other unrecognized confounding variables was always possible.

Conclusion

In the present study BP control rate was low (40%) and poor control was majority due to lack of SBP control. These results suggest that the majority of the treated hypertensive patients are complicated with additional cardiovascular risk factors such as smoking and obesity therefore required a good management of BP control. New studies such as case-control studies are needed in order to identify the possible obstacles that may be influencing these results as well.

Acknowledgment: We would like to thank all the health workers who collected the data for this study.

Conflict of Interest: The authors state that they have no conflict of interest.

References

1. Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med.* 1997;157(21):2413-46.
2. Burt VL, Whelton P, Roccella EJ, et al. Prevalence of hypertension in the US adult population: results from the Third National Health and Nutrition Examination Survey, 1988–1991. *Hypertension.* 1995;25(3):305-13.
3. Colhoun HM, Dong W, Poulter NR. Blood pressure screening, management and control in England: results from the health survey for England 1994. *J Hypertens.* 1998;16(6):747-52.
4. Al-Saadi R, Al-Shukaili S, Al-Mahrazi S, Al-Busaidi Z. Prevalence of Uncontrolled Hypertension in Primary Care Settings in Al Seeb Wilayat, Oman. *SQU Med J.* 2011;11(3):349-56.
5. Llisterri JL, Barrios V, Sierra Adl, Bertomeu V, Escobar C, Iez-Seguraf DG. Blood Pressure Control in Hypertensive Women Aged 65 Years or Older in a Primary Care Setting. MERICAP Study. *Rev Esp Cardiol.* 2011;64(8):654-60.
6. Banegas JR, Lundelin K, de la Figuera M, et al. Physician Perception of Blood Pressure Control and Treatment Behavior in High-Risk Hypertensive Patients: A Cross-Sectional Study. *PLoS ONE.* 2011;6(9):e24569.
7. Ohta Y, Tsuchihashi T, Kiyohara K. Consequence of masked hypertension in treated hypertensive outpatients: one-year follow-up study. *Clin Exp Hypertens.* 2011;33(4):270-4.
8. Düsing R. Overcoming barriers to effective blood pressure control in patients with hypertension. *Curr Med Res Opin.* 2006;22(8):1545-53.
9. Labarthe DR. *Epidemiology and prevention of cardiovascular diseases. A global challenge.* Gaithersburg, Md: Aspen Publishers 1998.
10. Kannel WB. Prevalence and implications of uncontrolled systolic hypertension. *Drugs Aging.* 2003;20(4):277-86.
11. van den Hoogen PC, Feskens EJ, Nagelkerke NJ, Menotti A, Nissinen A, Kromhout D. The relation between blood pressure and mortality due to coronary heart disease among men in different parts of the world. Seven Countries Study Research Group. *N Engl J Med.* 2000;342(1):1-8.
12. Appel LJ, Champagne CM, Harsha DW, et al. Effects of Comprehensive Lifestyle Modification on Blood Pressure Control. *JAMA.* 2002;289:2083-93.
13. Chobanian AV, Bakris GL, Black HR, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *JAMA.* 2003;289:2560-72.
14. Rosenbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. *Biometrika.* 1983;70(1):1-55.

15. Al-Rukban MO, Al-Sughair AM, Al-Bader BO, Al-Tolaihi BA. Management of hypertensive patients in primary health care setting: Auditing the practice. *Saudi Med J*. 2007;28(1):85-90.
 16. Al Khaja KA, Sequeira RP, Damanhori AH. Treatment of hypertension in Bahrain. *Ann Pharmacother*. 2003;37(10):1511-7.
 17. Rayner B, Becker P. The prevalence of microalbuminuria and ECG left ventricular hypertrophy in hypertensive patients in private practices in South Africa. *Cardiovascular J S Afr*. 2006;17(5):245-9.
 18. Rodri'guez-Roca GC, Artigao Ródenas LM, Llisterri Caro JL, et al. Control of Hypertension in Elderly Patients Receiving Primary Care in Spain. *Rev Esp Cardiol*. 2005;58(4):359-66.
 19. Zheng L, Li J, Sun Z, et al. Differential Control of Systolic and Diastolic Blood Pressure: Factors Associated With Lack of Blood Pressure Control in Rural Community of Liaoning Province, China. *Journal of Health Science*. 2007;53(2):209-14.
 20. Rezaeian S, Ahmadzadeh J. Assessment of Food Habits and Their Association with Cardiovascular Risk Factors in Employees. *International Journal of Collaborative Research on Internal Medicine & Public Health*. 2012;4(4):339-43.
 21. Ornstein SM, Nietert PJ, Dickerson LM. Hypertension management and control in primary care: a study of 20 practices in 14 states. *Pharmacotherapy*. 2004;24(4):500 -7.
 22. Hyman DJ, Pavlik VN. Characteristics of patients with uncontrolled hypertension in the United States. *N Engl J Med*. 2001;345:479-86.
 23. Lloyd-Jones DM, Evans JC, Larson MG, O'Donnell CJ, Roccella EJ, Levy D. Differential control of systolic and diastolic blood pressure: factors associated with lack of blood pressure control in the community. *Hypertension*. 2000;36:594 -9.
 24. Fernandez S, Tobin JN, Cassells A, Diaz-Gloster M, Kalida C, Ogedegbe G. The counseling african americans to control hypertension (caatch) trial: baseline demographic, clinical, psychosocial, and behavioral characteristics. *Implementation Sci*. 2011;6:100.
 25. Franklin SS, Jacobs MJ, Wong ND, L'Italien GJ, Lapuerta P. Predominance of isolated systolic hypertension among middle-aged and elderly US hypertensives: analysis based on National Health and Nutrition Examination Survey (NHANES) III. *Hypertension*. 2001;37:869-74.
 26. Llisterri JL, Rodri'guez GC, Alonso FJ, et al. Control of blood pressure in Spanish hypertensive population attended in primary health-care. PRESCAP2006 Study. *Med Clin (Barc)*. 2008;130(18):681-7.
 27. Edwards R. The problem of tobacco smoking. *BMJ*. 2004;328:217-9.
 28. CDC. *Non-communicable Diseases Risk Factors Surveillance Provincial Report, Islamic Report of Iran*. Tehran 2007.
 29. Appel LJ, Wright JT, Greene T, et al. Intensive Blood-Pressure Control in Hypertensive Chronic Kidney Disease. *N Engl J Med*. 2010;363(10):918-29.
-

30. Rayner B, Schoeman HS. A cross-sectional study of blood pressure control in hypertensive patients in general practice (the I-TARGET study). *Cardiovasc J Afr.* 2009;20(4): 224-7.

Table 1: Baseline characteristics of study population: clinical and demographic data

	Mean \pm SD	[95% CI]
Age	65.8 \pm 12.1	[64.8, 66.8]
Female gender (%)	61.3 %	[57.3%, 65.3%]
BMI, (kg/m ²)	25.9 \pm 4.1	[25.6, 26.3]
Obesity (BMI \geq 30)	18.3 %	[15.1%, 21.4%]
Smoker (%)	9.8 %	[7.5%, 12.5%]
Systolic BP	147.8 \pm 17.3	[146.4, 149.3]
Diastolic BP	85.9 \pm 6.5	[85.3, 86.4]
Blood pressure goal (%)	40.0 %	[35.9%, 44.1%]

Table 2: Variables Associated with Blood Pressure Control Reported with Unadjusted and Adjusted Odds Ratio

		Unadjusted OR	[95% CI]	P-value	Adjusted OR*	[95% CI]	P-value
Diabetic	No(reference)	0.39	[0.17, 0.91]	0.029	0.36	[0.15, 0.82]	0.01
	Yes						
Smoking	No(reference)	1.83	[1.10, 3.14]	0.02	1.70	[0.97, 2.98]	0.06
	Yes						
BMI	Normal(reference)	0.98	[0.94, 1.02]	0.391	0.52	[0.34, 0.80]	0.003
	Obese						
Age groups	< 50 yr(reference)	1.37	[0.74, 2.53]	0.314	1.14	[0.88, 1.47]	0.338
	51-70 yr						
	> 71 yr						
Family history of BP	No(reference)	0.93	[0.61, 1.43]	0.753	0.94	[0.62, 1.41]	0.74
	Yes						
Sex	Male(reference)	0.81	[0.56, 1.16]	0.246	0.73	[0.52, 1.03]	0.07
	Female						
Age		0.99	[0.95, 1.02]	0.362	1.00	[0.99, 1.02]	0.59

* Adjusted odds ratio was performed by propensity score and conditional logistic regression