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) \(^1\text{-}^3\), but it is one of the prevalent problems for primary health care (PHC) services all over the world, nowadays.\(^4\text{-}^7\)

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.\(^9\text{-}^{11}\) 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 ≥ 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 ≥ 30 kg/m\(^2\).

The mean of these PHC visits was used for the statistical analyses, and controlled BP was defined as BP ≤ 140/90 mmHg \(^13\), 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 ± 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. 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 $\geq 30$ 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 study $^19$, 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 age\textsuperscript{21-22}, obesity\textsuperscript{5, 23-24} and smoking\textsuperscript{24}. 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\textsuperscript{25}. As expected, in the present study rate of BP control decreased with age, as in other studies\textsuperscript{18-19}, 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\textsuperscript{5}. However, In the PRESCAP study\textsuperscript{26}, 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\%).\textsuperscript{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\textsuperscript{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


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

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SD</th>
<th>[95% CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>65.8 ± 12.1</td>
<td>[64.8, 66.8]</td>
</tr>
<tr>
<td>Female gender (%)</td>
<td>61.3 %</td>
<td>[57.3%, 65.3%]</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.9 ± 4.1</td>
<td>[25.6, 26.3]</td>
</tr>
<tr>
<td>Obesity (BMI ≥ 30) (%)</td>
<td>18.3 %</td>
<td>[15.1%, 21.4%]</td>
</tr>
<tr>
<td>Smoker (%)</td>
<td>9.8 %</td>
<td>[7.5%, 12.5%]</td>
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<tr>
<td>Systolic BP</td>
<td>147.8 ± 17.3</td>
<td>[146.4, 149.3]</td>
</tr>
<tr>
<td>Diastolic BP</td>
<td>85.9 ± 6.5</td>
<td>[85.3, 86.4]</td>
</tr>
<tr>
<td>Blood pressure goal (%)</td>
<td>40.0 %</td>
<td>[35.9%, 44.1%]</td>
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**Table 2:** Variables Associated with Blood Pressure Control Reported with Unadjusted and Adjusted Odds Ratio

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<thead>
<tr>
<th></th>
<th>Unadjusted OR</th>
<th>[95% CI]</th>
<th>P-value</th>
<th>Adjusted OR*</th>
<th>[95% CI]</th>
<th>P-value</th>
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<tr>
<td>No(reference)</td>
<td>0.39</td>
<td>[0.17, 0.91]</td>
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<td>[0.15, 0.82]</td>
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<tr>
<td>Smoking</td>
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<tr>
<td>No(reference)</td>
<td>1.83</td>
<td>[1.10, 3.14]</td>
<td>0.02</td>
<td>1.70</td>
<td>[0.97, 2.98]</td>
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<tr>
<td>BMI</td>
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<tr>
<td>Normal(reference)</td>
<td>0.98</td>
<td>[0.94, 1.02]</td>
<td>0.391</td>
<td>0.52</td>
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<td>Age groups</td>
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<td>&lt; 50 yr(reference)</td>
<td>1.37</td>
<td>[0.74, 2.53]</td>
<td>0.314</td>
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<td>[0.88, 1.47]</td>
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<tr>
<td>&gt; 71 yr</td>
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<td>Family history of BP</td>
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<td>0.93</td>
<td>[0.61, 1.43]</td>
<td>0.753</td>
<td>0.94</td>
<td>[0.62, 1.41]</td>
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<td>Male(reference)</td>
<td>0.81</td>
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<td>0.246</td>
<td>0.73</td>
<td>[0.52, 1.03]</td>
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<td>Age</td>
<td>0.99</td>
<td>[0.95, 1.02]</td>
<td>0.362</td>
<td>1.00</td>
<td>[0.99, 1.02]</td>
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* Adjusted odds ratio was performed by propensity score and conditional logistic regression