Factors Relating to Inadequate Control of Blood Pressure in Hypertensive Outpatients

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Adequate control of blood pressure (BP) is important for preventing hypertensive complications, but it has been reported that many patients remain uncontrolled despite regular care. We studied the factors contributing to inadequate control of BP. A cohort of hypertensive patients (n = 395) was queried in regard to their quality of life (QOL) and drug compliance, and the characteristics of responders (n = 256) were obtained from their clinical records. The achieved level of BP was determined by the mean of at least five readings at five recent visits. The mean age, BP, and body mass index were 73.0 ± 8.8 years, 139 ± 12/76 ± 8 mmHg, and 24.1 ± 3.5, respectively. There was no significant relation between the BP level and the QOL score. The patients were divided into 6 groups according to their attending physicians (A, B, C, D, E, and F), and the BP levels were compared among the groups. Systolic BPs were higher in the A (143 ± 13 mmHg) and the F (145 ± 12 mmHg) groups than in the B (135 ± 10 mmHg) group, whereas diastolic BPs were similar among the groups. Moreover, increases in therapy occurred at lower BP levels in the B group (158 ± 13/83 ± 14 mmHg, n = 14) than in the A group (173 ± 21/87 ± 16 mmHg, n = 8). Other characteristics of the clinical background were similar among the groups. Multivariate analysis indicated that inadequate BP control (≥140/90 mmHg) was associated with difference of physicians (A, C, D, or F vs. B), number of antihypertensive drugs (≥2 vs. 1), and increases in therapy (vs. no increases in therapy). These results suggest that physicians’ attitudes toward antihypertensive therapy play a crucial role in adequate BP control.

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Introduction

Hypertension is one of the greatest risk factors for cardiovascular mortality and morbidity (1). Although multiple clinical trials have consistently revealed the efficacy of hypertension treatment at preventing cardiovascular complications, suboptimal control of hypertension is a worldwide problem (2, 3). In Japan, a survey performed in 1995 showed that only 39% of elderly hypertensives (aged 50 to 94 years) had a blood pressure (BP) of < 140/90 mmHg, even though they were treated by physicians specializing in hypertension (4). A recent survey carried out between September 2000 and March 2001 in Japan also showed similar results (5). In other countries as well, adequate control is achieved in less than 50% of treated hypertensives (6–10). Improving the management requires an understanding of the factors relating to uncontrolled hypertension. Noncompliance (11), lack of access to medical care (12), and adverse effects of antihypertensive drugs (13) have all been considered as major causes of uncontrolled hypertension. However, recent reports have shown that uncontrolled hypertension also occurs in patients who receive regular treatment (7, 14), and have proposed that the patterns of practice of physicians are important contributors to inadequate control of BP (15–17). Therefore, we assessed factors influencing BP control, including differences in the attending physician, drug compliance, quality of life (QOL), and other clinical characteristics in hypertensive outpatients.
Methods

In August 1998, a self-administered questionnaire to evaluate QOL and drug compliance was prepared and mailed to 395 hypertensive patients visiting the Otsuki Hospital in Kochi, Japan. Two hundred and seventy-five (69.6%) of the patients completed and returned the forms. After exclusion of patients whose duration of antihypertensive therapy was less than 6 months, 256 (64.8%) patients were entered into analyses. The study was approved by the institutional ethics committee and written informed consent was obtained from each patient. We used an established and validated QOL scale for elderly Japanese patients (18) with some modification. The QOL questionnaire included 9 items on physical symptoms: headache, dizziness, shoulder stiffness, palpitation, fatigue, cough, loss of appetite, disturbance of concentration, and forgetfulness; 3 items on sleep quality: sleep disturbance, nightmares, and nocturia; and 4 items on psychological well-being and life satisfaction: feeling good, satisfaction with daily life, satisfaction with work performance, and getting along with family and neighbors. Possible responses to the items on physical symptoms and sleep quality were “none”, “sometimes”, or “often”. Possible responses to the items on psychological well-being and life satisfaction were “yes”, “intermediate”, or “no”. Then, for each patient, each of the three health concepts was assigned a score of 1, 2, or 3 in correspondence with the three classifications above. The overall QOL scales and the three subscales were expressed as the sum of the scores, such that higher scores indicated lower QOL. Drug compliance was classified as “almost complete,” “forget sometimes,” or “forget often” (19), and was considered to be good if drugs were almost completely taken by patients.

Characteristics of the 256 patients were obtained from their clinical records, including age, gender, body mass index (BMI), duration of hypertension treatment, medication (number of administered drugs and increase in dosage or number of the drugs), coexistence of target organ damage, history of cardio/cerebrovascular disease, coexistence of diabetes mellitus and hypercholesterolemia, and BP. BMI was calculated as weight (kg)/height(m)^2. Systolic and diastolic (Korotkoff phase V) BPs (SBP and DBP, respectively) were measured in the sitting position using a mercury column sphygmomanometer and evaluated by the mean of at least five readings at five separate visits at least 2 weeks apart just before the questionnaire was administered. Aggressiveness of antihypertensive therapy was evaluated by the level of BP achieved, number of antihypertensive drugs, and the level of BP at which medication was intensified. Inadequate control of BP was defined as SBP ≥ 140 mmHg and/or DBP ≥ 90 mmHg according to the sixth report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (20). The 256 patients were divided into 6 groups according to their attending physicians (A, B, C, D, E, and F), and their characteristics were compared among the groups. Each of the groups except the F group regularly visited the clinic and was treated by a single physician. Members of the F group visited the clinic irregularly and were treated by multiple physicians.

Statistical Analysis

Data are expressed as the means ± SD. Comparisons among groups were analyzed using one-way ANOVA for continuous data and Kruskal-Wallis test and χ^2 test for categorical data. Multiple comparisons among individual means were made using Sheffe’s method. The levels of BP at which medication was intensified were compared between the A and the B groups using Student’s t-test. The relationships between inadequate control of BP and clinical characteristics were analyzed using logistic regression. Values of p < 0.05 were considered to indicate statistical significance.

Results

Table 1 summarizes the characteristics of the 256 patients, and Fig. 1 shows the SBP and DBP levels achieved in patients as reported by their attending physicians. The averaged SBP was 139 ± 12 mmHg among all patients, and 115 (44.9%) of them did not reach the target SBP level.
The averaged DBP was 76 ± 8 mmHg among all patients, and only 9 (3.5%) of them failed to reach the target DBP level (<90 mmHg). Thus 116 of the 256 (45.3%) patients were inadequately controlled. The achieved levels of SBP were higher in the A and the F groups than in the B group. The achieved levels of DBP were not significantly different among all the groups.

The numbers and classes of antihypertensive drugs used are shown in Table 2. More than half of all patients were treated by a single drug, and the number of antihypertensive drugs used was not significantly different among the groups by Kruskal-Wallis test. When the classes of antihypertensive drugs were compared, calcium channel blockers were the most frequently used among all patients, and the frequency of use was similar among the study groups. Although thiazide diuretics were used in a small number of patients, the rate of prescription was significantly higher in the B group than in the A group. The use of each of the other classes of antihypertensive drugs was similar among the study groups.

Increases in the intensity of antihypertensive therapy during the five visits occurred in 8 patients in the A group, 14 patients in the B group, and one patient in the F group. No patients in the other groups were receiving additive medication to lower BP. Averaged BPs at which medication was intensified were 173 ± 21/87 ± 16 mmHg in the A group, 158 ± 13/87 ± 14 mmHg in the B group, and 160/98 mmHg in the F group. The increases in therapy occurred at significantly lower SBP level in the B group than in the A group (Table 3).
The averaged overall score of the QOL questionnaire was 24.7 ± 5.6 among all patients and similar among the study groups (Table 1). Averaged subscores of physical symptoms, sleep quality, and psychological well-being and life satisfaction were 14.1 ± 3.6, 5.0 ± 1.4, and 5.6 ± 1.9, respectively, among all patients and also similar among the study groups (data not shown). There was no significant relation between the QOL score and either the SBP or the DBP, as shown in Fig. 2.

The rate of good compliance was more than 90% among all patients and not significantly different among the study groups (Table 1). The other characteristics of patients were also similar among the study groups, with the exception that BMI was smaller in the A group than in the B group.

Factors associated with inadequate control of BP were evaluated by multiple logistic regression analysis (Table 4). Significant factors were difference of attending physicians (A, C, D, or F vs. B), number of antihypertensive drugs (≥2 vs. 1), and increases in therapy (vs. no increases in therapy). Age, gender, BMI, QOL score, drug compliance, duration of hypertension treatment, coexistence of target organ damage, history of cardio/cerebrovascular disease, and coexistence of diabetes mellitus and hypercholesterolemia were not significantly associated with inadequate control of BP.

**Table 4. Multivariate Analysis of Factors Associated with Inadequate BP Control**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician (vs. B)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>3.41</td>
<td>1.65–7.06</td>
<td>0.001</td>
</tr>
<tr>
<td>C</td>
<td>2.69</td>
<td>1.08–6.68</td>
<td>0.033</td>
</tr>
<tr>
<td>D</td>
<td>4.72</td>
<td>1.24–17.93</td>
<td>0.023</td>
</tr>
<tr>
<td>E</td>
<td>2.37</td>
<td>0.93–6.03</td>
<td>0.071</td>
</tr>
<tr>
<td>F</td>
<td>5.47</td>
<td>2.17–13.81</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No. of antihypertensive drugs (vs. 1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1.23</td>
<td>0.59–2.55</td>
<td>0.58</td>
</tr>
<tr>
<td>2 or more</td>
<td>2.38</td>
<td>1.22–4.61</td>
<td>0.011</td>
</tr>
<tr>
<td>Increases in therapy (vs. no increases in therapy)</td>
<td>5.43</td>
<td>1.86–15.88</td>
<td>0.002</td>
</tr>
</tbody>
</table>

**Fig. 2. Relation between blood pressure levels and QOL score. SBP, systolic blood pressure; DBP, diastolic blood pressure; QOL, quality of life.**

**Discussion**

We examined whether the BP levels achieved by antihypertensive treatment differed among attending physicians, and assessed the factors influencing BP control in hypertensive outpatients in typical clinical practice. The patients were divided into six groups according to their attending physician, with the clinical backgrounds of patients being similar among the groups. The achieved levels of SBP, however, varied widely from 135 mmHg to 145 mmHg, and clearly differed among the groups. Moreover, medication was intensified at a lower level of SBP in the strictly controlled group. Multivariate analysis revealed that difference of attending physicians was an independent factor for inadequate control of BP. These results suggest that physicians’ attitudes regarding antihypertensive therapy play a crucial role in achieving adequate BP control.

Recent studies suggest that uncontrolled hypertension can also be attributed to physicians’ lack of aggressiveness in treating hypertension in patients with good adherence to treatment (7, 14). Berlowitz et al. reported that many physicians were not aggressive enough in their management of hypertension and that patients receiving more intensive therapy had better control of BP (7). Therefore, achieved levels of BP might differ among physicians according to the target level that the physicians set out. Although previous studies have shown that achieved levels of BP differed among clinics (21) or regions (22), it has not been reported whether achieved levels of BP differ among attending physicians in treatment of hypertensive patients with similar backgrounds. In the present study, the finding that the physician in group B achieved a lower level of SBP and intensified the medication at a lower level than the physician in group A means that the former physician was more aggressive in treating hypertension. Moreover, physician B used thiazide diuretics more frequently than physician A did, although the total numbers
of antihypertensive drugs used were similar among the 6 study groups. Prescription of diuretics was reported to improve control of BP in refractory hypertension in previous reports (23). SBP was also significantly higher in the F group than in the B group. Because patients in the F group irregularly visited the clinic and were treated by multiple physicians, we speculate that the uncontrolled SBP in the F group was attributed to reluctance to intensify medication by the attending physicians due to an insufficient patient–physician relationship (24). Thus, the present study showed that achieved levels of BP differed among physicians who treated hypertensive patients with similar backgrounds and suggests that physicians’ willingness is an important factor in the adequate control of BP.

Although noncompliance with therapy has been shown to be associated with uncontrolled hypertension (11), we did not observe a relation between drug compliance and BP control in the present study as reported in a previous study (7). The discrepancy might be caused by very high rate (> 90%) of good compliance in responders to the questionnaire in the present study. Had information on the compliance in nonresponders been available and added to the analysis, compliance status might have been related to the BP control.

There was no significant relation between the achieved level of BP and the QOL score. Aggressive therapy to lower BP below the target level might have caused adverse effects, such as dizziness or fatigue, and thereby compromised QOL. However, we did not observe deteriorated QOL in intensively treated patients whose achieved levels of BP were near 100 mmHg in SBP and 55 mmHg in DBP. This result is consistent with a subanalysis of the Hypertention Optimal Treatment (HOT) study which showed no apparent adverse impact on QOL in intensively treated patients (25). However, adverse effects and deteriorated QOL due to antihypertensive medication can lead to withdrawal of therapy. The present study was cross-sectional, and thus we cannot rule out the possibility that patients with deteriorated QOL due to excessive hypotension had dropped out from the analysis.

In conclusion, nearly half of treated hypertensive patients with good adherence to therapy did not reach the target level of BP in the present study, and physicians’ attitudes to antihypertensive therapy contributed to the inadequate BP control. Adequate use of diuretics is suggested to be effective against uncontrolled hypertension. Physicians should be more aggressive in their attempts to lower BP in order to prevent hypertensive complications.

References
20. Joint National Committee on Prevention, Detection,


