ORIGINAL ARTICLE

Poor blood pressure control and its associated factors among older people with hypertension: A cross-sectional study in six public primary care clinics in Malaysia

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Abstract

Introduction: Hypertension is highly prevalent in the older people. Chronic disease care is a major burden in the public primary care clinics in Malaysia. Good blood pressure (BP) control is needed to reduce the morbidity and mortality of cardiovascular disease (CVD). This study aimed to determine the status of BP control and its associated factors among older people with hypertension in public primary care clinics.

Materials and methods: A cross-sectional study on hypertensive patients aged 18 years and above was conducted in six public primary care clinics in Federal Territory, Malaysia. A total of 1107 patients were selected via systematic random sampling. Data from 441 (39.8%) patients aged 60 years and more were used in this analysis. BP control was determined from the average of two BP readings measured twice at an interval of 5 min. For patients without diabetes, poor BP control was defined as BP of ≥140/90 mm Hg and ≥150/90 for the patients aged 80 years and more. For patients with diabetes, poor control was defined as BP of ≥140/80 mm Hg.

Results: A total of 51.7% (n = 228) of older patients had poor BP control. The factors associated with BP control were education level (p = 0.003), presence of comorbidities (p = 0.015), number of antihypertensive agents (p = 0.001) and number of total medications used (p = 0.002). Patients with lower education (less than secondary education) (OR = 1.7, p = 0.008) and the use of three or more antihypertensive agents (OR = 2.0, p = 0.020) were associated with poor BP control.

Conclusion: Among older people with hypertension, those having lower education level, or using three or more antihypertensive agents would require more attention on their BP control.

Introduction

Hypertension is a common chronic disease burden globally and locally.[1] It is one of the major risk factors for the cardiovascular diseases (CVDs) such as stroke, ischaemic heart disease and heart failure.[2] In Malaysia, hypertension is a major burden of chronic disease care in public primary care clinics.[3] There is an increased number and proportion of older people worldwide due to declining fertility rate and better healthcare.[4] Hypertension is highly prevalent in the older people. In the West, the prevalence of hypertension among older people ranges from 53% to 72%.[5] In Southeast Asia, the prevalence of hypertension among older people is as high as in the West, for example 51.1% in Thailand[6] and 73.9% in Singapore.[7] In Malaysia, the Third National Health and Morbidity Survey conducted in 2006 reported a prevalence of 74.0% hypertension among older people.[8] The high prevalence increases the burden of older people's healthcare, especially in the management of hypertension and its associated complications.

The complications of hypertension can be delayed with good BP control. A meta-analysis reported that BP reduction is associated with large benefit in stroke, cardiovascular, all-cause mortality and heart failure risk in older people.[9] However, the rate of BP control is low. Local studies have shown

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that BP control rate among older people in the community ranged from 22.6% to 34.0%.[8,10,11] These results were from the residential home care and household surveys.

Malaysia is a developing country in Southeast Asia. The public and private sectors, and non-governmental organisations support its healthcare system.[12] The public sector is highly subsidised by the government, but the service costs of the private sectors are out-of-pocket expenses. Thus, the burden of the chronic diseases care is mainly borne by the public primary care clinics.[3] There is limited literature on the status of BP control among older patients in the public primary care clinics. Therefore, the objectives of this study were to determine the BP control rate and its associated factors among older patients with hypertension in the public primary care settings. This article presents a part of the results, pertaining to older patients; of a larger cross-sectional study investigating treatment non-adherence among hypertensive patients. We hope that the results of this study would provide an insight into the status of BP control among the older patients, to improve the management and care of these patients.

Methods

This was a cross-sectional study conducted in six public primary care clinics in Federal Territory, Malaysia. At the time of this study, there were only six primary care clinics with family medicine specialists in the state of Federal Territory. These six clinics were selected because of having more organised hypertension registry.

The participants were selected via systematic random sampling of hypertensive patients who attended the follow-up clinics for more than 3 months. The number of follow-up hypertensive patients attending each of the clinics ranged between 1000 and 3000. A total of 10% of the patients were recruited from each clinic. The third patient, which was generated using computer random number, who attended the follow-up session, was selected as the first participant. Every tenth patient thereafter was selected systematically. The initial inclusion criteria were hypertensive patients aged ≥18 years and on pharmacotherapy for ≥1 year. The exclusion criteria were foreigners, pregnant women, medically unstable patients who need urgent medical attention (such as acute renal failure and acute myocardial infarction), and patients with concurrent psychiatric problems (such as depression and schizophrenia). A total of 1107 patients were recruited. For this article, the analysis had included the data of 441 (39.8%) patients aged ≥60 years.

The details of data collection had been described elsewhere.[13] In brief, the data were collected using a few methods. Face-to-face interview was conducted for sociodemographic characteristics and clinical history (duration of hypertension, family history of hypertension and smoking status). The adherence of medication, salt intake and appointment keeping was measured using self-administered Hill-Bone high BP compliance scale questionnaire (HBTS).[14] HBTS questionnaire was chosen because of its advantage of measuring medication adherence, adherence to salt intake and appointment keeping. Modified Morisky scale was not chosen because it measured only medication adherence and was not validated locally at the time of the study. Although, the Hill-Bone questionnaire also was not validated locally, content and face validation were undertaken prior to data collection. HBTS consisted of 14 items (Nine items for medication taking subscale, three items for salt intake subscale and two items for appointment keeping subscale). Items assessing medication adherence included missing pills, skipping medications and medication refill; items assessing salt intake included frequency of taking high salt diet; items assessing appointment keeping included missing appointment and ensuring next appointment date. The scores for each item of the questionnaire ranged from 1 to 4 with higher score denoting higher level of adherence. Assistance was provided to patients who were unable to read. Information on treatment and comorbidity profiles were retrieved from the medical records by physicians.

Definition of participants

We used the United Nations' demarcation age of 60 years to define older people, as Malaysia uses this definition in its national policy.[15] A person was considered to have hypertension if there was a documented evidence of a diagnosis of hypertension with systolic BP of ≥140 mm Hg or the diastolic BP of ≥90 mm Hg on each of the two successive readings were measured in rested position with arm at heart level using a cuff of appropriate size[16]; and who was being treated with an antihypertensive agent.

Clinical measures

BP control was determined from the average of two BP readings measured twice with an interval of 5 min during the follow-up. Trained registered nurses in the respective clinics performed BP measurements by using calibrated mercury sphygmomanometers. Poor control was defined as BP of ≥140/90 mm Hg for patients without diabetes and ≥150/90 mm Hg for patients aged 80 years and more without diabetes. For the patients with diabetes, poor control was defined as BP of ≥140/80 mm Hg.[16] The attending physicians at the respective public primary care clinics determined the underlying concomitant comorbidity based on medical history, physical examination and laboratory results. The smoking status was considered as "yes" if the patient was a current smoker during the interview. Total number of medications taken was defined as the sum of all types of medications taken for long-term treatment of patients' chronic illness, e.g. antihypertensive agents, antidiabetic agents, antilipid agents, etc.

This study obtained ethical approval from the University Research Ethics Committee of Universiti Putra Malaysia [UPM/FPSK/PADS/T7-MJKEtikaPer/F01 (LECT_FEB (09)33] and the Medical Research Ethics Committees of Ministry of Health, Malaysia [NMRR-09-301-3349].

Statistical analysis

Data were analysed with Statistical Packages for Social Sciences (SPSS) version 20.0. Categorical variables were presented as frequency (*n*) and percentage (%) and continuous variables were presented as mean and standard deviation. The relationship between BP control and the independent variables were analysed using Pearson's Chi square and independent t-tests. Multivariate logistic regression was used to determine the associated factors for poor control.

Variables with the result of p-value <0.2 in bivariate analysis were included in multivariable logistic regression. To avoid over-adjusting for the model, the variable "presence of comorbidity" was not included in the model in view of its association with the variable "total number of medications taken."

Results

The mean age of the patients was 65.9 years (SD 5.1 years). There were 225 (51.0%) men. The majority were Chinese (45.4%), followed by Malays (37.4%) and Indians (16.6%). The majority had secondary education level (40.8%) and were staying with others (88.4%).

A total of 51.7% (n = 228) of the patients had poor BP control. Majority (87.5%) of the patients had one or more comorbidities. Three common comorbidities reported were dyslipidaemia (72.1%), diabetes (45.4%) and obesity (25.4%). Approximately one-third of the patients had hypertension for more than 10 years. Approximately one-quarter of the patients were treated with three or more antihypertensive agents. Approximately 45% of the patients had been prescribed five or more types of medication. The common types of antihypertensive medications use included calcium channel blocker (53.5%), ACE inhibitors (50.8%), beta-blockers (44.2%) and diuretics (33.3%).

Education level (p = 0.003), presence of comorbidities (p = 0.015), number of antihypertensive agents (p = 0.001) and number of total medication use (p = 0.002) were associated with BP control status (Table 1). There was no significant difference between the mean scores of the good and poor BP-controlled groups for medication adherence [mean score = 3.75 (good BP-controlled group) vs. 3.72 (poor BP-controlled group), p = 0.342], salt intake adherence [mean score = 3.13 (good BP-controlled group) vs. 3.14 (poor BP-controlled group), p = 0.854], and appointment keeping [mean score =3.44 (good BP-controlled group) vs. 3.54 (poor BP-controlled group), p = 0.092]. In the multivariate logistic regression analysis, patients with lower education (less than secondary education) were 1.7 times more likely to have poor BP control when compared with those who had secondary or higher education (OR = 1.7, p = 0.008). Patients who had been prescribed three or more antihypertensive agents were more likely to have poor BP control, compared with patients who had been prescribed single antihypertensive agent (OR = 2.0, p = 0.020) (Table 2).

Table 1. Association between poor blood pressure control status and sociodemographic and clinical parameters

Variables	Good blood pressure control, *n* (%)	Poor blood pressure control, *n* (%)	Chi-square	*p* value
Sociodemographic profile				
Age (years)				
60–64	110 (51.7)	110 (48.2)		
65–69	58 (27.2)	67 (29.4)		
70–74	32 (15.0)	36 (15.8)	0.537	0.970
75–79	9 (4.2)	10 (4.4)		
≥80	4 (1.9)	5 (2.2)		
Gender				
Male	103 (48.4)	122 (53.5)	1.170	0.279
Female	110 (51.6)	106 (46.5)		
Ethnicity				
Malay	86 (40.4)	79 (34.7)		
Chinese	85 (39.9)	115 (50.4)	5.297	1.151
Indian	40 (18.8)	33 (14.5)		
Others	2 (0.9)	1 (0.4)		
Education level				
Less than secondary education	94 (44.1)	133 (58.3)	8.892	0.003
Secondary or higher education	119 (55.9)	95 (41.7)		
Staying alone				
Yes	29 (13.6)	22 (9.6)	1.694	0.193
No	184 (86.4)	206 (90.4)		
Clinical parameters				
Smoking status				
Yes	12 (5.7)	22 (9.6)	2.407	0.121
No	199 (94.3)	206 (90.4)		
Presence of comorbidities				
Yes	178 (83.6)	208 (91.2)	5.919	0.015
No	35 (16.4)	20 (8.8)		
Duration of hypertension				
1–5 years	72 (33.8)	75 (32.9)		
6–10 years	69 (32.4)	68 (29.8)	0.635	0.728
>10 years	72 (33.8)	85 (37.3)		
Number of antihypertensive agents				
1	76 (35.7)	51 (22.4)		
2	98 (46.0)	108 (47.3)	13.245	0.001
≥3	39 (18.3)	69 (30.3)		
Total number of medications taken				
<5	134 (62.9)	110 (48.2)	9.582	0.002
≥5	79 (37.1)	118 (51.8)		

Table 2. Multivariate simultaneous logistic regression analysis of risk factors associated with poor blood pressure control in older persons with hypertension

Factors	OR	95% CI	*p* Value
Education level			
Less than secondary education	1.703	1.150, 2.521	0.008
Secondary or higher education	1		
Number of anti-hypertensive agents			
1	1		
2	1.480	0.929, 2.359	0.099
≥3	2.007	1.116, 3.608	0.020

Control for staying alone status, smoking status, group of hypertension duration, total number of medications group

Discussion

This study was set out to examine the BP control status among older people with hypertension treated in public primary care clinics. It was found that nearly half of the patients achieved the target control. Those with lower education level and using three or more anti-hypertensive agents were associated with poor BP control.

Following the Malaysian hypertension clinical practice guidelines, a target BP of <140/80 mm Hg was set for 45.5% of the patients with comorbid diabetes.[16] This target level is recommended currently during the revision of the guideline 2013 as the previous recommended target level (BP <130/80 mm Hg), though stringent, it had not been supported by the recent large randomised control trials, especially in elderly for any additional benefits.[17,18] Studies showed that the control of BP to a level of 140/90 mm Hg in people with diabetes can prevent or at least delay CVD and chronic kidney disease.[17,18] Thus, the task force for the management of arterial hypertension of the European Society of Hypertension and of the European Society of Cardiology has recommended a single systolic BP target of 140 mm Hg for virtually all patients in their updated guideline.[17,18] If the BP target of <140/90 mm Hg was used for all patients, then, slightly more than half (56.5%) of the studied patients would have achieved the target.

This study showed that higher number of antihypertensive agents was associated with odds of poor BP control. The relationship between the number of antihypertensive agents and BP control was complex. Most hypertensive patients would need two or more antihypertensive agents to achieve their BP targets[19–21] and the number of anti-hypertensive agents increases with disease severity and concomitant comorbidities. Therefore, the number of anti-hypertensive agents could be a surrogate marker for BP control. However, increasing the number of anti-hypertensive agents used should also lead to better BP control as physicians would titrate the medication to BP control. The majority of the participants in this study had comorbidities; hence, they could have difficulty in BP control and required more medications. On the other hand, higher number of antihypertensive agents invariably contributes to polypharmacy, which could affect adherence, thus resulting in poor BP control.

The present findings did not show an association between BP control and medication adherence. Logically, good BP control is associated with good adherence to medication,[22,23] and adherence is associated with education level.[24] It was thought that the BP control could still be associated with adherence because from the multivariate logistic regression analysis, poor BP control was associated with lower education. The absence of association between medication adherence and BP control could be attributed to several explanations. The patients did not always report non-adherence behaviour. Patients could overestimate their adherence when reporting. The questionnaire used might not be valid enough to identify their adherence level. Hence, further examination on the validity of the questionnaire is warranted. On the other hand, education level was measured in a more objective way, hence, showing a positive association.

The strength of this study was that it was carried out in the public primary care clinics, which cater for the majority of the chronic disease care in this country.[3] The limitations of this study include the cross-sectional design, which would not give the causal–effect relationship of poor BP control and its associated factors. Some of the factors such as doctors' knowledge and practice behaviour in hypertension management and patients' self-care management including physical activity and diet control were not studied and these could affect the BP control. In assessing appointment keeping, reviewing records might be a better way than the questionnaire; we faced challenges of missing documentation, as the follow-up plan was not clearly written in the records.

In conclusion, the BP control rate for older people treated in primary care clinics was suboptimal. We hope that those with lower education level or using three or more antihypertensive agents would be given more attention during the consultation.

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How does this paper make a difference to general practice?

- Half of the older patients with hypertension treated in public primary care clinics did not achieve the target control.
- The older patients with lower education level or who are using three or more antihypertensive agents need to be given more attention during the consultation.

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