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Availability and use of home blood pressure measurement in the Czech general population

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ABSTRACT

Background: Home blood pressure monitoring (HBPM) is recommended for hypertensive patients as a tool to improve both blood pressure (BP) control and compliance with treatment.
Methods: We evaluated the use of HBPM in hypertensive subjects examined during a cross-sectional general population survey (Czech post-MONICA). Models predicting the availability and use of HBPM were constructed using univariate and multivariate logistic regression.
Results: Of 449 treated hypertensive patients (mean age 63.2 years, 52.1% women), 250 (55.7%) reported that they had a device for BP monitoring available at home. The factors associated with HBPM availability were older age, university education, marital status, longer duration of hypertension and nonsmoking. Of the 250 subjects with HBPM available, 40% used HBPM regularly (at least once a week), and this ratio increased with the number of antihypertensive drugs taken (monotherapy 30%, dual combination 43%, combination of ≥3 drugs 48%; $p_{trend} = 0.028$). BP control was similar in those using HBPM regularly and those who used HBPM irregularly or did not use it at all (54.5 vs. 49.7%; $p = 0.52$).
Conclusion: HBPM is available to more than a half of treated hypertensive patients from the general population. However, only minority of the patients perform home blood pressure measurement regularly.

Introduction

Home blood pressure monitoring (HBPM) eliminates some disadvantages of office blood pressure measurement such as low reproducibility and both white coat and placebo effect and its use helps to differentiate masked, white-coat and sustained arterial hypertension. Moreover, it correlates more closely with target organ damage [1] and cardiovascular mortality [2] than does office blood pressure.

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According to experts, physicians should recommend HBPM to the majority of patients with known or suspected hypertension [3–5]. Home blood pressure monitoring is useful for monitoring the response to antihypertensive treatment in daily practice [3–5] and may improve adherence to treatment [6]. It has been shown that the use of HBPM is associated with better blood pressure (BP) control [7]. The prevalence of HBPM use in hypertensive patients ranges from 24% to 75% [8,9]. However, data about the use of HBPM in Central Europe remain unknown.

The aim of the present study was therefore to investigate the availability of HBPM in a sample from the Czech general population. Moreover, we investigated which factors are associated with regular HBPM use and whether regular HBPM use is associated with better blood pressure control.

Methods

Study population

The Czech post-MONICA (MONItoring trends and determinants in CArdiovascular disease) study is a population survey studying trends and determinants of cardiovascular risk factors in a 1% random sample of the Czech population in nine districts of the country. Methods of the Czech post-MONICA study are described elsewhere [10]. All participants gave written informed consent. The study was approved by the local ethics committee of the University Hospital in Pilsen, and was in accordance with the Declaration of Helsinki. Our study included subjects aged 25–75 years, permanently residing in Pilsen district. The response rate in this district was 68%. For the present analysis we selected 552 subjects (41.7%) who self-reported having hypertension diagnosed by a health care professional.

The research protocol included the administration of a standardized questionnaire to obtain information on each subject's medical history, HBPM and medication use. The questionnaire was filled in and blood pressure measurement was carried out during a single visit at clinic. Blood pressure was measured three times in the right arm with the subject in the sitting position after at least 5 min at rest. Standard mercury sphygmomanometers and correctly sized cuffs were used. The participant's right arm was supported at heart level. The maximum inflation level was determined before the actual measurement. Blood pressure values were recorded to the nearest 2 mmHg. The mean value of the last two readings was used for further analysis. Diabetes mellitus (DM) was defined as the use of antidiabetic treatment or fasting glycemia $\geq$7.0 mmol/l or postprandial glycemia $\geq$11.1 mmol/l. History of cardiovascular complication was defined as history of myocardial infarction, angina pectoris, revascularization, stroke or transient ischemic attack.

Statistical methods

For database management and statistical analyses, we used SAS software, version 9.3 (SAS Institute Inc., Cary, NC, USA). We compared the groups of subjects using the Fisher exact test. We searched for factors associated with HBPM availability and use using univariate and multivariate logistic regression analyses. Only covariates at least borderline significant in univariate models were considered to enter the multivariate regression models. For evaluation of trend across subgroups of patients, we used the Cochran–Armitage trend test.

Results

Characteristics of participants

Of the 552 participants who reported having arterial hypertension, 263 (48%) reported that they had a device for BP measurement available at home. In further analyses, we focused only on 449 (81.3%) patients currently using antihypertensive drugs. In these treated subjects, the availability of HBPM was slightly higher (55%). Correlates of HBPM availability are listed in Table 1. The availability of HBPM was equal among men and women, diabetics and non-diabetics, and patients with and without a history of cardiovascular complications (p for all $\geq$0.14). Home blood pressure monitoring availability was higher among older subjects (>65 years) than among younger subjects (< 50 years; odds ratio [OR] 2.80, 95% confidence interval [95%CI] 1.38–5.69), in patients with university education (when compared with subjects with primary education, the unadjusted OR was equal to 1.76, 95% CI: 1.00–3.08), married subjects (unadjusted OR 2.77, 95%CI: 1.79–4.28), and in patients with longer duration of hypertension. On the other hand, current smokers had HBPM less available than nonsmokers (OR 0.56, 95%CI: 0.35–0.91; Table 1). Results of multivariate regression analysis were similar to that obtained using univariate regression models, except for current smoking which was no longer associated with HBPM availability (adjusted OR 0.81, 95%CI: 0.49–1.35).

Control of hypertension (BP <140/90 mmHg) did not differ between the two groups (51.6 vs. 59.3%; $p = 0.11$).

Correlates of regular (at least once a week) home blood pressure measurement

In the next step we investigated which factors were associated with regular use of HBPM (Table 2). Forty percent of treated hypertensive patients performed regular home BP measurement and this ratio increased moderately with the number of antihypertensive drugs used (on monotherapy 30%, on dual combination 43%, and on combination of $\geq$3 drugs 48%; p for trend = 0.028; Fig. 1). Another marginally significant factor was the presence of DM (OR 1.82, 95%CI: 0.99–3.31). We did not observe any difference between those who regularly used HBPM compared with those who measured their home BP irregularly or did not measure it at all, in respect of age, sex, education, duration of hypertension, marital status, and a history of cardiovascular complications ($p \geq 0.34$; Table 2). Furthermore, we constructed a multivariate logistic regression model with the number of antihypertensive drugs and DM as independent variables. The results of this analysis were confirmatory to univariate regression (Table 3).

Blood pressure control was similar in both the groups (54.5 vs. 49.7%; $p = 0.52$) as well as in subgroups of subjects treated by monotherapy or by combination therapy ($p \geq 0.56$; data not shown).