ARAŞTIRMA / RESEARCH

Adherence of primary care physicians to recommended guidelines for blood pressure measurement

Kan basıncı ölçümünde birinci basamak sağlık hizmetlerinde görev alan hekimlerin güncel kılavuzlara uyumu

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Abstract

Purpose: Accurate blood pressure measurement (BPM) is the main point for the proper diagnosis and management of hypertension. In this paper, we aim to assess the approaches taken by family physicians (FPs) about BPM and blood pressure measurement devices' (BPMDs) standards.

Materials and Methods: A survey was prepared in accordance with the current hypertension guidelines to assess the knowledge and awareness of FPs about BPM methods and BPMDs' standards. Questionnaires were filled out face-to-face with family physicians.

Results: In total, 300 of 412 local FPs were included in this study. Office BPMs were preferred by 41.7% of physicians, whereas 42.7% expressed their preference for HBPMs for hypertension diagnosis and treatment. Aneroid devices were chosen by 61.3% of FPs who believed that their knowledge and skills about BPM were excellent. The rate of FPs who preferred devices not compatible with one of the recommended devices in the guidelines was 79.7%. A total of 53% of FPs recommended upper arm automatic BPMDs to their patients and only 25% of FPs recommended BPMDs proved by clinical studies.

Conclusion: We concluded that the awareness, knowledge, and routine daily practice of FPs in Mersin regarding BPM and BPMDs are poor and need to be improved. The results of this study may help us to question the approaches of FPs to hypertensive patients and may improve HT management.

Keywords:. Blood pressure measurement device, family physician, home blood pressure, hypertension

Öz

Amaç: Hipertansiyon tanı ve tedavisinde, en önemli nokta kan basıncının doğru ölçülmesidir. Çalışmamızda aile hekimlerinin kan basıncı ölçüm metotları ve kan basıncı cihaz standartları hakkındaki yaklaşımlarını değerlendirmeyi amaçladık.

Gereç ve Yöntem: Aile hekimlerinin hipertansiyon ölçümmetotları ve hipertansiyon ölçüm cihazları hakkındaki farkındalıklarını ve bilgilerini değerlendirmek amacıyla güncel hipertansiyon kılavuzlara uygun olarak bir anket hazırlandı. Anketler aile hekimleri ile yüz yüze doldurulmuştur.

Bulgular: Toplamda 412 aile hekiminden 300'ü çalışmaya dahil edildi. Hipertansiyon tanı ve tedavisinde hekimlerin %41.7'si ofis ölçümünü , %42.7'si evde kan basıncı ölçümünü tercih etti. Kan basıncı ölçümleri hakkındaki bilgi ve becerilerinin mükemmel olduğunu düşünen aile hekimlerin %61.3'ü aneroid cihazı tercih etti. Kılavuzlar tarafından önerilen cihazlara uygun olmayan cihazları tercih eden aile hekimlerinin oranı %79.7'idi. Aile hekimlerinin 553.7'si hastalarına otomatik üst kol tansiyon cihazı tavsiye ederken, sadece %25'i klinik çalışmalarla önerilen tansiyon ölçüm cihazlarını tavsiye etti.

Sonuç: Çalışmamızda Mersin'deki aile hekimlerinin günlük partiklerinin, tansiyon ölçümü ve ölçüm cihazları hakkındaki bilgi ve farkındalık seviyelerinin düşük düzeyde olduğu ve geliştirilmesi gerektiğinin farkına vardık. Çalışmamızın sonuçları, aile hekimlerinin hipertansiyon hastalarına yaklaşımını sorgulamamıza ve hipertansiyon yöntemini geliştirmeye yardımcı olabilir.

Anahtar kelimeler: Aile hekimi, evde kan basıncı, hipertansiyon, kan basıncı ölçüm cihazı

INTRODUCTION

Hypertension (HT) is one of the most common preventable health problems in the world. Its prevalence is quite high with 19% suffering from it in Canada, 30% in the USA, and 30-32% in Turkey[1,2]. While the prevalence of HT in Turkey is 31%, it has been shown to be as high as 80-90% in the older age group[2]. However, the control rate of HT is not enough all over the world[3]. In the last decade, there have been improvements in the control of hypertension in Turkey. Overall, in 2012, patients' awareness of hypertension has increased compared to 2003 (54.7%; 40.7%). Additionally, there have been significant improvements in the treatment of hypertension in 2012[4]. Although some improvements have been made in the management of HT, there is a need to improve HT's detection and control in Turkey.

Detecting high blood pressure is the first step in preventing and controlling HT. In the diagnosis of hypertension, home blood pressure measurements, repetitive office measurements, or 24-hour blood pressure measurements are recommended[5]. In the 2018 European Society of Cardiology (ESC) hypertension guide, more attention has been drawn to recurrent home blood pressure measurements and office measurements compared to the 2013 ESC hypertension guide. This is because repetitive measurements instead of one-time measurements in the office are much more effective in the diagnosis and treatment of hypertension[5,6]. ESC 2018 recommends using devices with standard features, proven by clinical studies to measure blood pressure accurately and reliably and have validation protocols approved[5].

In addition to using the correct device for measuring blood pressure, the device used in conjunction should also be calibrated at regular intervals[5]. Rouse et al. showed that 100 of 1462 blood pressure measuring devices in 231 primary care health centers were not in a condition to be used and most centers did not have a calibration control plan[7]. On the other hand, Akpolat et al. showed that there was a significant difference between validated devices and not valeted devices about correct measurement of blood pressure (68% versus 15%)[8].

Admittance by a physician is an essential parameter for both awareness and control of HT[4]. Primary care physicians play a significant role in the first level of contact with hypertensive individuals in our national health system.

Accurate measurement of blood pressure in the diagnosis of hypertension is essential[5]. In recent years, the importance of repetitive measurements in the diagnosis and treatment of the hypertension has increased considerably[5,9,10]. Therefore, protocols for measurement methods and measuring devices are available in the guidelines for accurate measurement[5,9-11]. In this study, we aimed to assess the knowledge and attitudes of the family physicians about the measurement methods and devices in blood pressure diagnosis and treatment. This may help plan an education program about family physicians to make better their knowledge of the diagnosis and treatment of hypertension.

MATERIALS AND METHODS

This survey was carried out based on the volunteerism of physicians. Survey questions were asked to physicians in visits made to the primary care and public health centers where they worked. All the interviews were performed face to face with the FPs by the first author.

It was learned with the information that was obtained from the Directorate of Public Health in the city of Mersin that there were 412 family physicians. Three hundred of these physicians were accessed.

The study design was approved by the Mersin University Human Research Ethics Committee (Date: 27.02.2015 and reference number: 86). Approval was also taken from the Mersin Provincial Public Health Office for the participation of FPs who were working in Mersin (Date: 14.01.2014 and reference number: 41964773). The age, sex, professional experience, and educational status of FPs were recorded.

Questionnaire

A survey was prepared in accordance with the current hypertension guideline recommendations for BPM and BPMD's (Table 1)[6,9-11]. The questionnaire was administered to assess general knowledge, skills and awareness of FPs about BPM methods and BPMDs' standards. The questions addressed the frequency of diagnoses of hypertension, the preferred method of blood pressure measurement in diagnoses, treatment and follow-up, the devices that are used and recommended to patients.

Table 1. Questionnaire about the awareness and attitudes of family physicians towards blood pressure measurement and measurement devices

	n	%
1. I have an advanced level of knowledge on blood pressure measurement devices.		
Disagree	145	48.3
Agree	155	51.7
2. What is your priority in the diagnosis and management of hypertension?		
Office blood pressure measurement	157	52.3
The direction of the complaints of the patient	68	22.6
Home blood pressure measurement	41	13.7
Measurements performed in other centers	34	11.4
3. Which of the following do you perform first to keep your knowledge on hypertension up to date?		
I follow the guidelines on hypertension.	120	40.0
I participate in scientific meetings on hypertension.	110	36.7
I ask specialists about the latest developments.	42	14.0
I search the internet.	28	9.3
4. When I examine a patient for the first time, I measure the blood pressure in both arms.		
Disagree	135	45.0
Agree	165	55.0
5.How often do you diagnose hypertension in the center where you work as a physician?		
Frequently	164	54.7
Occasionally	111	37.0
Rarely	25	8.3
6. I measure orthostatic blood pressure in patients with dizziness or balance problems.		
Disagree	120	40.0
Agree	180	60.0
7. What type of measuring device do you recommend to your patient for blood pressure measurement at home?		
Mercury device, through the arm	21	7.0
Aneroid (air) device, through the arm	56	18.7
Automated (digital) device, through the upper arm	159	53.0
Automated (digital) device, through the wrist	64	21.3
8.How do you guide your patients when they consult you about which blood pressure measurement device to purchase?		
My patients do not ask me about that.	40	13.3
I suggest them to ask medical companies.	75	25.0
I recommend popular brands.	110	36.7
I recommend devices that are scientifically confirmed for accuracy.	75	25.0
9. What type of device do you use and at which the location do you measure the blood pressure of your patients in the center where you work?		
Mercury device, through the arm	44	14.7
Aneroid (air) device, through the arm	181	61.6
Automated (digital) device, through the upper arm	60	20.0
Automated (digital) device, through the wrist	15	4.7

Statistical analysis

The categorical parameters were presented in numbers and percentages (n, %). The Chi-square test or Fisher's exact test; whichever was appropriate, was used for the comparison of categorical variables. The distribution of the numerical parameters was evaluated using histograms, coefficients of variation, and the Kolmogorov-Smirnov test. The normally distributed numerical parameters were presented in mean±standard deviation. The non-normally distributed parameters were summarized as median (minimum-maximum) values. The Student's-t test was used to compare the numerical parameters showing normal distribution between two independent groups. The comparison of the non-normally distributed numerical data between the two groups was performed with the Mann–Whitney-U test. Chi-square test was used to analyze categorical parameters. The Kruskal Wallis test was used to compare three or more numerical variables showing anormal distribution. The Bonferroni correction was used to find adjusted p-values in multiple comparisons.

RESULTS

In total, 300 Local FPs were included in the study. Table 1 shows the general results of the survey. Office BPM was preferred by 52.3% of physicians whereas 13.7% preferred HBPM for hypertension diagnosis and management. The preferences of family physicians who update their knowledge about hypertension using the current guidelines when diagnosing hypertension is shown in Table 2.

Table 2. Preferences about diagnosing hypertension in family physicians

	Do you follow the guidelines on hypertension?		P-value
	I follow (n = 120)	I do not follow (n = 180)	
What is your priority in diagnosis and management of hypertension?			
Home blood pressure measurements (%)	31 (25.8%)	20 (11.1%)	P = 0.043
Others (Office blood pressure measurements, the measurements performed in other centers, the direction of the complaints of the patient) (%)	89 (74.2%)	160 (88.9%)	P = 0.043
When I examine a patient for the first time, I measure the blood pressure in both arms.			
Agree (%)	61 (50.8%)	64 (42%)	P < 0.001
Disagree (%)	59 (49.2%)	116 (58%)	P < 0.001
I measure orthostatic blood pressure in patients with dizziness or balance problems.			
Agree (%)	83 (69.2%)	97 (46.1%)	P = 0.019
Disagree (%)	**37 (30.2%)**	**83 (53.9%)**	**P = 0.019**

The results of the questions about BPMDs to the physicians who believed that their knowledge and skills of BPM were very good is shown by Table 3. Mercury devices are used by 11% of physicians who believed that their knowledge and skills of BPM were very good (p<0.05). Among the physicians who diagnose hypertension frequently, 62% use aneroid sphygmomanometers, 24% automatic devices, and 14% mercury sphygmomanometer in their workplaces (p> 0.05). When physicians were asked "Which blood pressure measurement devices do you recommend to your patients for home blood pressure monitoring?," 53% of the physicians answered upper arm automatic BPMDs, 21.3% answered automatic wrist BPMDs, 18.7% answered as aneroid sphygmomanometers, and 7.0% answered as mercury sphygmomanometers

Table 3. The attitudes of physicians about blood pressure measurement devices

	I have an advanced level of knowledge of blood pressure measurement devices.		P-value
	Agree (n = 146)	Disagree (n = 154)	
What is the type of device and the location where you measure the blood pressure of your patients in the center where you work?			
Mercury device (%)	16 (11%)	28 (18.1%)	P < 0.001
Aneroid device (%)	86 (59.3%)	95 (61.3%)	P < 0.001
Upper arm automated device (%)	34 (23.4%)	26 (16.8%)	P < 0.001
Wrist automated device (%)	9 (6.3%)	6 (3.8%)	P < 0.001
How do you guide your patient when she/he consult you about which blood pressure measurement device to purchase?			
My patients do not ask me. (%)	19 (11.7%)	21 (13.0%)	P = 0.024
I suggest them to ask medical companies. (%)	47 (32.4%)	28 (17.3%)	P = 0.045
I recommend popular brands. (%)	50 (34.5%)	60 (37.2%)	P = 0.021
I recommend devices that are scientifically confirmed. (%)	23 (15.9%)	52 (32.2%)	P < 0.001

When FPs were asked "How do you guide your patients if you are asked which blood pressure measurement device to buy?," interestingly, 41.6% of them answered well-known brands, 22.7% answered that they suggest them to ask pharmaceutical companies, 25% answered devices approved by scientific studies. A few of the physicians (10.7%) declared they have never been faced with a question like this. In total, 44% of FPs had no idea about where patients buy BPMDs for HBPM. Only 41% of physicians evaluated orthostatic hypotension was in patients who admitted to complaints of vertigo and imbalance.

DISCUSSION

The main outcome of this study is that inadequate importance has been given to HBPM by FPs in clinical practice. At the same time, serious inaccuracies were found regarding blood pressure measurement devices. All blood pressure measurements such as the clinic, home and ambulatory predict the risk of a cardiovascular event; however, HBPM is the strongest predictor of adverse cardiovascular outcomes[12,13]. Besides, HBPM is also important in the diagnosis of hypertension, particularly white coat hypertension and masked hypertension. White coat hypertension means high blood pressure in office but normal blood pressure at home. When high blood pressure is measured in the office, it should be verified with the blood pressure of the patient at home because the patient may have been affected by psychological factors due to the office environment. The importance of home blood pressure measurement for masked hypertension is to detect abnormal high blood pressure at home even though normal blood pressure is measured in the office[4]. Despite the numerous advantages of HBPM, only 13.7% of FPs preferred HBPM for the diagnosis and management of hypertension in our study. Additionally, it was seen that physicians who update themselves according to the guidelines use at-home blood pressure measurements in monitoring more frequently than those who do not follow the guidelines.

Nowadays, mercury sphygmomanometers are no longer used due to concerns related to the potentially harmful effects of mercury on health and environment[14]. Seven percent of the physicians who participated in our study recommended mercury blood pressure devices to patients, which seems to be an incorrect approach. It was found that 14% of the physicians who diagnosed hypertension frequently in primary care settings used mercury devices. Furthermore, our study shows that 11% of physicians

who believed that their knowledge about BPMDs was sufficient used mercury devices. Apart from mercury devices, aneroid (auscultatory) or automated (oscillometric) devices (more often) are currently used in daily practice[15]. Blood pressure measurement is actually very simple by the automated devices which are among the less error-prone **measurement** methods[16]. Automated devices also have the advantage of memory capacity[17]. Automated upper arm BPMDs have been recommended as the preferred method of BPM whereas wrist BPMDs have not, except for patients with inappropriate upper arm[15].

Automated devices may be preferred in the office instead of aneroid devices as the measurements are more correlated to ambulatory BPMs results and target organ damage. They are also associated with lower prevalence of white coat hypertension and improved accuracy[6]. In our study, 61.6% of FPs who frequently made diagnoses of hypertension in their daily clinical practice chose aneroid devices (p<0.05).

Automatic upper arm devices were recommended by 53% of the FPs for HBPM in our study. Akpolat et al. investigated the characteristics of home sphygmomanometers of 1281 hypertensive patients and reported that 60.1% of them were wrist automated devices, whereas 24.5% were upper arm automated devices, and 15.1% were the other devices[10]. When we evaluated the results of our study and the Akpolat et al. study, we concluded that the devices recommended by physicians do not seem be in concordance with the ones the patients have chosen to purchase.

Device accuracy is important when selecting a BPMD to buy. Therefore, patients should be appropriately guided. Protocols about standards of sphygmomanometers have been determined in various countries[18]. Each BPMD should meet these standards before being recommended for home **measurement** by the general population[19]. Blood pressure measurement devices should be reviewed regularly for validation standards and each BPMD should fulfill the accuracy requirements[20]. Accurate testing by a BPMD may prevent patients from erroneous treatment decisions[21]. Akpolat et al. reported a significant difference between the accuracy of BPMs performed by validated and non-validated devices (68% versus 15%)[8]. In our current study, when physicians were asked which HBMDs to buy, only 25% of them suggested HBMDs which have had their accuracy proved in clinical trials.

Physicians may guide the patients who plan to purchase BPMDs and may check whether they purchased appropriate BPMDs. A national cross-sectional study demonstrated that most of the patients (94%) did not report their BPMs to physicians[17].

Additionally, a hypertension diagnosis can frequently cause dizziness and imbalance in orthostatic hypotension patients. This is an important cause of falls and should not be ignored[6]. Our study showed that only 41% of physicians considered orthostatic hypotension in patients presenting dizziness or imbalance. However, 69% of the physicians who updated themselves according the current guidelines, preferred orthostatic blood pressure measurement.

Measurement of blood pressure from both arms was performed by only 50.8% of physicians who preferred to update themselves according to the current hypertension guidelines in our study. However, the importance of BPMs from both arms has been emphasized in various reports. BPMs from both arms are useful for detecting target organ damage, aortic coarctation, subclavian steal syndrome and this might help to make some various changes in the management of the hypertenison[4,11]. Sufficient attention was also not paid to orthostatic BPM in clinical practice. More importance should be given to these subjects in review courses which may encourage physicians to follow latest guidelines more closely[6].

One of the weaknesses of our study is that it is single-centered. Another limitation is that, when family physicians were interviewed, whether the devices they use are valid and calibrated was not evaluated by an objective method and was only assessed from their answers. If all the family physicians in Mersin could be contacted, the applicability of the study would increase. In addition to family physicians, internal medicine specialists or nephrologists could also be included in the study, so that differences in knowledge and attitudes about blood pressure measurements and devices could be compared. Family physicians could be evaluated for their preferred drug groups in the treatment of hypertension and questions could be prepared about follow up of the hypertensive patients. Then we could determine FPs compliance with the current guidelines.

The strengths of our study are that it is one of the few studies conducted on the knowledge and awareness

of blood pressure measurement in family physicians. The interview questions were prepared according to the current guidelines, a fact which enhances the value of our work. Meeting physicians face-to-face instead of telephone contributed to making the survey more accurate.

We concluded that the awareness, knowledge and routine daily practice of FPs about BPM and BPMDs need to be improved in our city. Most of FPs chose and recommended inappropriate BPMDs. Inaccurate measurements may cause serious problems not only in clinical practice but also in health policy and health research. Appropriate BPMDs are essential in the diagnosis and better management of hypertension. All BPMDs should be evaluated against the gold standard according to a proven protocol as the accuracy of BPMDs is of fundamental importance.

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