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Ofis ölçümleri ile kan basıncının kontrol altında olduğu düşünülen hipertansif hastaların ambulatuvar kan basıncı monitörizasyonu ile değerlendirilmesi: Üç büyük ilde ileriye yönelik gözlem çalışması (AKB3İL çalışması)

Evaluation of hypertensive patients whose blood pressures were supposedly under control according to office blood pressure measurements with ambulatory blood pressure monitoring: an observational prospective study in three metropolitan cities (AKB3IL study)

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ÖZET

Amaç: Bu çalışmada ofis ölçümleri ile kan basınçlarının kontrol altında olduğu düşünülen hastalarda, 24 saatlik ambulatuvar kan basıncı monitörizasyonu ile kan basınçlarının gerçekten kontrol altında olup olmadığı ve kan basıncı düzeylerinin güncel kılavuzlarda belirtilen eşik değerler ile uyumunun değerlendirilmesi amaçlanmıştır. ***Çalışma planı:*** Çalışmaya antihipertansif tedavi almakta olan ve ofis ölçümlerinde kan basınçları kontrol altında olduğu düşünülen 940 hasta alındı. Tüm hastalara 24 saatlik ambulatuvar kan basıncı monitörizasyonu uygulandı. ***Bulgular:*** Çalışmaya alınan 617 (%65.6) hastada gerçek kontrol sağlandığı, 323 (%34.4) hastada ise kontrolün sağlanamadığı belirlendi. Kan basıncı değerlerinin zaman dilimlerine göre incelenmesinde en fazla eşik değer üstü sonuçların gece ve sabah erken saatlerinde olduğu görüldü. Ofis ölçümüyle kan basıncının kontrol altında olduğu düşünülen hastaların büyük bir kısmında gece ve sabah erken hipertansiyonunun devam ettiği, özellikle de diyabet, kronik böbrek yetersizliği ve metabolik sendrom gibi yüksek kardiyovasküler riskli gruplarda bu durumun daha da belirgin olduğu saptandı.

Sonuç: Antihipertansif tedavinin 24 saat etkinlik ve sabah erken saatlerdeki etkinliği yönünden izlenmesi optimal risk modifikasyonu yönünden gerekli bir yaklaşım olarak görünmektedir.

ABSTRACT

Objectives: The aim of the study is to evaluate hypertensive patients who are supposedly under control according to office blood pressure measurements with 24 hour ambulatory blood pressure monitoring for determining their actual controlled hypertension rate. İn addition, we investigate the adherence ratio of blood pressure measurements to current guidelines. ***Study design:*** Nine hundred-forty hypertensive patients whose blood pressures were supposedly under control according to office blood pressure measurements were enrolled in the study. Twenty-four hour ambulatory blood pressure monitoring was performed on ali of them.

Results: Actual controlled hypertension was determined in 617 (65.6%) patients vvhereas 323 (34.4%) patients had uncontrolled hypertension. The blood pressure measurements that were over threshold values were seen mostly at night and in the early morning during ambulatory blood pressure monitoring. Nocturnal and early morning hypertension was determined in most of the patients whose BPs were supposedly under control according to office blood pressure measurements. This was especially true in patients with high cardiovascular risk such as diabetes mellitus, chronic kidney failure, and metabolic syndrome.

Conclusion: Monitorization of the efficacy of antihypertensive therapy during 24 hour and the early morning period is essential for optimal risk modification.

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Hypertension is one of the important causes of morbidity, and mortality.[1] In our country prevalence of hypertension detected in TEKHARF survey realized near the end of 1990s was found to be 39.3 % in women, and 30.1 % in men.[2] In PATENT survey performed more recently, its prevalence was estimated as 31.8 % (36.1% in women; 27.5 % in men), and it was also determined that only 31 % of the hypertensive patients were receiving antihipertensive treatment, while blood pressures of merely 20 % of those on treatment were under control.[3] Four years later follow-up data of these cases were reviewed in HINT study which found incidence of hypertension as 21.4 percent.[4] Although worldwide prevalence of hypertension varies from country to country, reports indicate rates ranging between 5, and 70 %. .[5]

According to literature reports suboptımal blood pressures account for 62 % of cerebrovascular, and 49 % of ischemic heart diseases.[1] Its early diagnosis, appropriate treatment, and adequate follow-up of hypertension which affects every one of three individuals apparently carry greater importance. As a blood pressure (BP) measurement method, although 24-hour ambulatory blood pressure monitorization (ABPM) is a gold standard, especially in recent years BP monitorization at home is advised more frequently. However nowadays, for the evaluation of BP, frequently office BP measurements are used. However, for the diagnosis of hypertension, office BP measurements are known to be inadequate in the evaluation of treatment, and determination of prognosis.[6] Evidence are available which suggest that isolated office hypertension can be seen in nearly 15 % of the population, and can be encountered in an important proportion (1/3) of the individuals with diagnosis of hypertension.[7]

Individuals with normal office BP measurements (<140/90 mmHg) might have higher ambulatory or home BP values which are termed as “isolated ambulatory hypertension” or “masked hypertension.” The prevalence of isolated ambulatory hypertension in the population is almost equal to that of the isolated office hypertension.[7] Even in the absence of apparent increase in clinical blood pressure values, ambulatory, and home BP levels may provide useful information especially in individuals with more than one risk factors, and organ damage.

Abbreviations:

ACE Angiotensin converting enzyme
ABPM Ambulatory blood pressure measurement
ESC European Society of Cardiology
ESH European Society of Hypertension
BP Blood pressure
CRF Chronic renal disease
MetS Metabolic syndrome

In this prospective, and observational study, our aim was both to evaluate whether or not blood pressures were under control as assessed by 24-hour –ABP measurements in individuals treated with any antihipertensive agent or their combination, and whose blood pressure was supposedly under control as demonstrated by office BP monitorization, and to evaluate degree of compliance of blood pressure levels to threshold values indicated in current guidelines published by European Society of Cardiology/European Society of Hypertension /ESC/ESH).[7]

PATIENTS AND METHODS

Patient group

This survey was realized as a prospective observational registration study in 3 metropolitan cities (Ankara, , Istanbul, and Smyrna) between February –May 2011 with the participation, and supervision of a total of 94 specialists (cardiologists, 28 % , internists, 54 % , and primary care physicians, 18 %). More than 18-year-old 940 hypertensive patients who consented to the collection of their data whose blood pressures were supposedly under control (systolic/diastolic BP < 140/90 mm Hg) with antihipertensive mono- or combination drug therapy (diuretics, calcium channel blockers, ACE inhibitors, and angiotensin receptor blockers)for the previous 3 months. as determined by office BP measurements were included in the study Cases with established or suspect secondary hypertension or those with clinical condition preventing completion of ambulatory blood pressure measurements were excluded from the study

The patients received information about the study, and undersigned consent forms were obtained. For this observational study ethics committee approval was obtained from TR, Ministry of Health, and Social Welfare.

Collection of Data

Data concerning patients’ demographic characteristics, curriculum vitae (CV), physical examination (PE) findings, and if available laboratory test results, habits, concomitant diseases, blood pressure values, and drugs used. were recorded. Ambulatory blood pressure monitorization was performed using a measurement device (Mıcrolıfe, WatchBP 03) complying with the criteria of ESC/ESH guidelines[7]

Authorized technicians provided education for study participant specialists about directions for use of the device, and post-recording evaluation of data. Hourly blood pressure measurements were performed. Minimum 9, and maximum 73 BP measurements for each patient were considered for validity evulation. Blood pressures of study group participants were measured either less (n=199; 21.2 %) or more (n=741; 78.8 %) than 20 times. Mean (n=22.5±4.8), and median (n=23) number of valid measurements were also estimated. BP assessments were based on measurements performed between 10:00 AM-10:00 PM for daytime, and 10:00 PM-08:00 AM for nighttime. Early morning estimates were given as an average of measurements done between 07:00 AM and 09:00 AM. For the evaluation of the efficacy of antihipertensive treatment based on BP measurements (under control or not) , systolic, and diastolic threshold values defined by 2007ESC/ESH guidelines were taken into consideration. As an accepted criterion for a controlled hypertension, an average of 24-hour systolic/diastolic BP measurements should be less than 130/80 mmHg,

All demographic data, and BP values of all patients were gathered in one center, and data base was constructed via double entry of all data. Unfit data were questioned, and controlled. Cases with previous diagnosis of diabetes or under antidiabetic therapy were defined as diabetics, and dialysis-dependent diabetic patients with glomerular filtration rates less than 30 ml/min as CRF patients. Cases with body mass indexes of >30 kg/m^2 were termed as obese patients. Diagnosis of metabolic syndrome (MetS was made based on 2001-NCEP ATP III [8] diagnostic criteria.

Statistical evaluation

Statistical analyses were performed using Stata Version 10.0 program. From information available in patient files, diagnosis of hypertension was made based on risk groups for hypertension. Differences with reference to baseline values were calculated in consideration of BP measurements recorded within the previous three months, and results of ambulatory blood pressure measurements obtained during the study period. Appropriate descriptive statistical analyses (means, median, ratio, standard deviation, 95 % confidence interval) of data were performed. In comparisons of subgroups, for ratios *chi*-square test or Fisher test, for medians Mann-Whıtney U-test, and for means Student t test were used. For the measurement of statistically significant changes covariance analyses (ANCOVA) were conducted. Clinical significance was evaluated on the basis of ambulatory BP measurements.

Predictors of patient characteristics (gender, age, duration of hypertension, "dipper", and "non-dipper" values detected during ambulatory BP measurements) were tested using multiple regression analyses. To compensate for the missing data because of inadequate number of patients, and in consideration of correlations between repeated measurements, equivalence techniques were used.

RESULTS

Mean age of the study patients (women 59.1 %, men, 40.9 %) was 58.6±10.8 years. Mean duration of hypertension was estimated as 89.6±76.7 months. Diabetes mellitus (n=253; 26.9 %), CRF (n=21; 2.2 %), and MetS (n=202; 21.4 %) were detected among study patients. Demographic characteristics of the study group are shown in Table 1.

For the treatment of hypertension, antihipertensive agents were used as monotherapy or in combinations of 2, 3 or 4 drugs by 25.5, 41.8, 24.4, and 8.3 % of the patients Antihipertensive agents used by the patients are given in Table 2.

Table 1. Demographic characteristics of the study group

	n (%)	Mean.±SD
Gender		
Male	384 (40.9)	
Female	556 (59.1)	
Age (yrs)		58.6±10.8
Duration of hypertension (mos)		89.6±76.7
Total cholesterol (>200 mg/dl)	281 (29.9)	
Triglyceride (>150 mg/dl)	214 (22.7)	
Obesity	334 (35.5)	
Body mass index (kg/m^2)		29.4±4.6
Smoking	133 (14.1)	
Diabetes mellitus	253 (26.9)	
Chronic renal failure	21 (2.2)	
Metabolic syndrome	202 (21.4)	
Registered BP measurements (mmHg)		
Right arm systolic		133.1+15.8
Right arm diastolic		81.3±10.0
Left arm systolic		132.3±16.3
Left arm diastolic		81.2+10.1

BP: blood pressure .

Table 2. Antihypertensive agents used by the patients

Treatment	n (%)	Treatment	n (%)
Monotherapy	240 (25.5)	Triple combination	229 (24.4)
ARB	65	RASB+D+KKB	83
ACEI	57	RASB+D+BB	112
CCB	50	RASB+CCB+BB	26
BB	47	KKB+D+BB	6
D	21	Other	2
Dual combination	393 (41.8)	Quadruplet combination	78 (8.3)
RASB+D	252	RASB+D+BB+KKB	69
RASB+CCB	64	Other	9
RASB+BB	52		
Other	25		

ARB Angiotensin receptor blocker; ACEI Angiotensin converting enzyme inhibitor; CCB Calcium channel blocker BB: Beta blocker, D Dıureticas; RASB: Renin angiotensin system blocker

Right arm office BP measurements, and mean ambulatory blood pressure values are summarized in Table 3. To determine whether or not hypertensive state of the patients was under control, BPs assessed by office BP measurements, and then 24-hour Holter monitorization of ABPM, were evaluated based on 24-hour mean systolic/diastolic BP threshold values (<130/80 mmHg). Actual BP control was achieved in 617 (65.6 %) patients, but failed in 323 (34.4 %) cases.

In patients unable to achieve target BP levels, mostly inadequate dosage was implicated. In the group which achieved actual control, 158 (25.6 %) patients used monotherapy, and 459 (74.4 %) patients combination therapy. In the group which could not achieve BP control, the patients were using monotherapy (n=71; 22) or combination (n=252; 78 %) therapy. The rates of achievement of the targeted daytime, nighttime, and early morning blood pressures, dipper, and nondipper patterns in patients under treatment are given in Table 4. In table 5, the reasons for failure in achievement of targeted blood pressure levels are provided.

Table 3. Mean right arm BP values of office BP, and ABPM measurements

	General (n=940)	DM (n=253)	CRF (n=21)	MetS (n=202)
Office BP (mmHg)				
SBP	133.10±15.8	136.09±17.51	133.71±17.24	134.10±16.58
DBP	81.32±10.03	81.28±10.29	83.19±8.14	81.26±10.32
ABPM and BP(mmHg)				
24 –hour SBP (mmHg)	123.46±13.8	126.71±15.53	131.38±18.24	124.93±14.54
24 –hour DBP (mmHg)	74.73±8.37	74.80±8.74	81.00±7.87	75.83±8.98
Daytime SBP (mmHg)	127.29±14.4	130.02±16.02	133.81±18.95	128.26±15.24
Daytime DBP (mmHg)	78.13±9.62	77.91±9.71	84.14±9.15	78.67±9.83
Nighttime SBP (mmHg)	118.98±15.0	122.31±16.87	129.14±19.82	120.26±15.59
Nighttime DBP (mmHg)	70.86±9.22	70.96±9.73	77.76±8.77	71.91 ±9.94
Early morning SBP (mmHg)	123.44±17.4	127.04±19.48	131.45±21.07	125.08±17.75
Early morning DBP (mmHg)	75.01±11.59	75.31±11.78	80.60±11.95	76.29±12.36

BP: Blood pressure; ABPM: Ambulatory blood pressure monitorization; DM: Diabetes mellitus; CRF: Chronic renal failure; MetS: Metabolic syndrome: SBP: Systolic blood pressure; DBP: Diastolic blood pressure.

Table 4. Rates of achievement of target blood pressure values, and dipper/non-dipper paterns in patients under treatment

	n	%
Achievement of target BP (Daytime <130/80 mmHg)		
Yes	617	65.6
No	323	34.4
Achievement of target BP (Daytime <135/85 mmHg)		
Yes	637	67.8
No	303	32.2
Achievement of target BP (Nighttime <120/70 mmHg)		
Yes	406	43.2
No	534	56.8
Achievement of targeted BP (Early morning <120/70 mmHg)		
Yes	559	59.5
No	381	40.5
Systolic BP		
Dipper	357	38
Non-Dipper	583	62
Diastolic BP		
Dipper	494	52.6
Non-Dipper	446	47.4

BP: Blood pressure

Comparative mean systolic, and diastolic BP values of 24-hour, day-, and nighttime, and early morning BP measurements in the study group with reference to threshold values determined by ESC/ECH guidelines are shown in Figure 1 a. Early morning systolic, and diastolic BP values were found to be higher than reference threshold values.

However in diabetic patients in addition to early morning systolic, and diastolic BP values, nighttime systolic BP values were higher than reference threshold values (Figure lb).

In patients with chronic renal failure, even though systolic, and diastolic BP values were above reference threshold levels in all time frames, nighttime, and early morning systolic, and diastolic BP values were found to be significantly higher (Figure lc).

In patients with metabolic syndrome in addition to early morning systolic, and diastolic BP values, nighttime diastolic BP values were significantly higher than reference threshold levels (Figure 1d).

Table 5. The reasons for failure to achieve targeted blood pressure levels

Inadequate drug dosage	168	58.3
Inefficacy of drugs used	70	24.3
Patient –related causes	75	26
Incompliance to treatment	27	9.4
Patients not compliant with recommendations	61	21.2

" the percentages were calculated based on 288 patients who couldn't achieve target blood pressures. More than one reason may be detected in in some patients

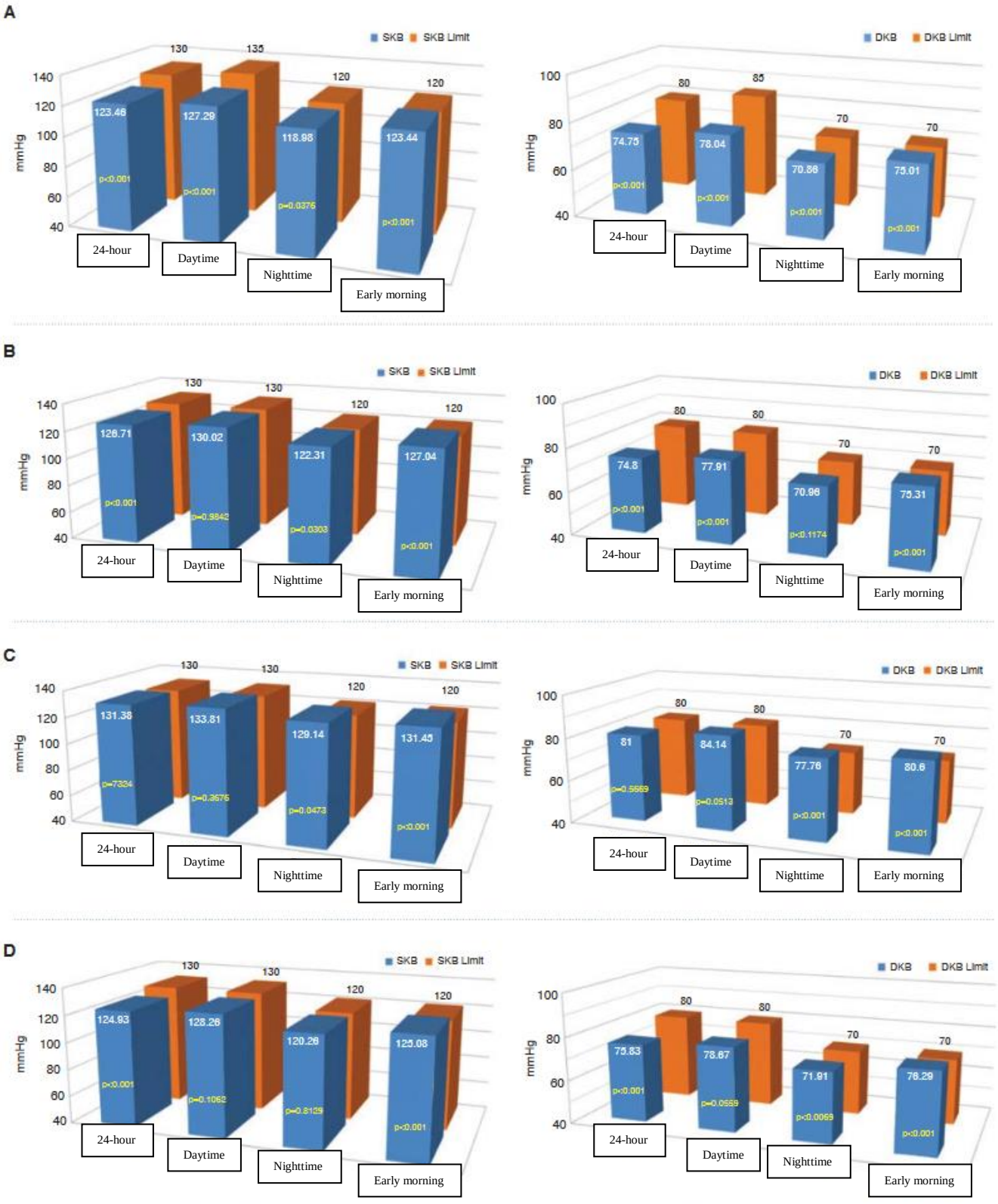
DISCUSSION

Nowadays hypertension is the most frequently detected risk factor contributing to global mortality.[9] Because of demonstration of a linear correlation between increased BP levels, and cardiovascular, and cerebrovascular events, and achievement of significant drop in heart failure, myocardial infarction, and stroke with antihipertensive treatment, hypertension is accepted as an important cardiovascular risk factor. In these days, beyond general approach to hypertension which is determined relative to a certain threshold value, hypertension is considered as a criterion to evaluate total cardiovascular risk. The main objective of identifying, and treating higher BP values is to decrease cardiovascular disease, related morbidiy, and mortality

Even though marked decrease in mortality, and morbidity has been achieved in recent years due to major developments in drug treatment, and active BP control, we are still far away from meeting required BP targets.

Target BP is less than 140/90 in both low, and high- risk patients. In diabetic patients, and those known to have renal, and cardiovascular disease with very high cardiovascular risk, targeting much lower systolic BP (< 130 mm Hg) might be more reasonable [10] However in ACCORD-BP[11], and INVEST [12] studies conducted in diabetic patients, any significant difference was not found as for cardiovascular endpoints between intensive antihipertensive treatment, and standard treatment regimes targeting BP values of < 130 mm Hg, and < 140 mm Hg respectively.

In PATENT study [3] performed in our country, blood pressures of 8.1 % of all hypertensives, and 20.7 % of patients receiving antihipertensive treatment were under control.



Şekil 1. (A) Comparisons of systolic, and diastolic blood pressure values determined by ambulatory blood pressure monitorization in all study group, (B) diabetic patients, patients with (C) chronic renal disease, and (D) metabolic syndrome with reference to threshold values in ESC/ESH guidelines.

It was determined that lower levels of awareness, and administration of inadequate treatment to patients play a role in detection of such low rates.

For practical, and economical reasons most frequently office/clinical blood pressure measurements were used for the monitorization of hypertension. It is known that unexpectedly higher BP values can be detected during BP measurements performed in office or clinics, due to "white coat" effect, and cases with masked episodic or nocturnal hypertension can be overlooked. For accurate diagnosis, and regulation of the treatment, studies aiming at determination of optimal BP measurement method are ongoing.[13-15] Recommendations suggest use of ABPM for the diagnosis, and monitorization of hypertension.[16] Besides, at least one application of ABPM appears to be the best alternative to evaluate severity, and prognosis of hypertension, and perform a realistic risk stratification.[16, 17] ABPM offers important advantages as for cost-effectiveness. It is especially important in very high-risk patients with comorbidities as CRF, diabetes or MetS.[18-24] Though not useful as ABPM, daytime, and nighttime home BP monitorization can detect masked hypertension, and accurate, and reliable diagnosis of isolated office hypertension can be made. It is less costly, and patient compliance is more improved. BP data obtained through this method can be registered easily, and outcomes of the treatment can be monitored.

In our survey, blood pressures of 940 hypertensive residents of three metropolitan cities with a past history of an average of 7 years of hypertension were evaluated by ABPM. Actual BP was achieved only in nearly 65 % of the patients whose blood pressures were supposedly under control. However in 35 % of the patients target BP levels were not achieved. In approximately 60 % of the cases, inadequate drug dosage was implicated by physicians for this failure to achieve BP control However in this condition where more than one reason was thought to play a role, demonstration of patient-related causes in 56 % of the cases indicates that only inadequate drug dosage can not be held responsible for unsuccessful BP control.

Ambulatory BP monitorization can evaluate circadian rhytmic changes in blood pressure, and some abnormalities which were demonstrated to be related to unfavourable cardiovascular prognosis can be detected.

In many studies the association between non-dipper pattern which is one of the most important abnormalities in circadian BP patterns with target organ damage has been been demonstrated in both hypertensive, and normotensive individuals. [25] In patients with non-dipper hypertension, greater amount of increases are known to occur in left ventricular mass, and the incidence of cerebrovascular disease, cardiovascular mortality, and morbidity.[26] Blood pressure values were analysed in certain time frames, and values over threshold levels were most frequently observed in nighttime, and early morning measurements. Verdecchıa et al.[27] reported the frequency of non-dipper hypertension as ranging between 10-40 percent. In our study these rates were found to be 62, and 47.4 % for systolic, and 47.4 % for diastolic BP. In our country, another study conducted among hypertensive patients reported the incidence non-dipper hypertension as 43.6 percent.[28]

Though early morning rise in early-morning BP is a result of circadian changes in BP, the most current data reveal that this increase is not an"innocent" finding, at all. Clinical importance of increases in early morning BP measurements over predetermined cut-off values, has been established thanks to increased application of ambulatory BP monitorization in recent years. Though this phenomenon has not been adequately emphasized in guidelines of hypertension, available data reveal that rapid rise in early morning BP is associated with cardiovascular events independent of office blood pressure values.[29] Increased incidence of acute cardiovascular events such as heart attack, and stroke during early morning hours is thought to be partially related to this circadian changes in BP.[30] In this study, sustained early morning hypertension was detected in the majority of the patients whose BPs were supposedly under control, and especially in risky groups as diabetes, CRF, and MetS increase in BP values was more prominent. Increased activity of sympathetic nervous system dependent on diurnal rhythm of renın-angiotensın-aldosterone system (RAAS), and activation of sympathetic system in early morning hours with awakening are two underlying mechanisms of increase in morning BP. [31, 32] Exaggerated diurnal response in association with increased RAAS, and sympathetic system activity in diabetes, CRF, and MetS, are thought to be the main etiological factors of morning hypertension observed in these patients. Though a consensus has not been reached over a definite cut-off value for the non-physiological increase in the early morning BP values, in many observational study increase in mean systolic BPs over 15 mm Hg measured within the first 2 hours after arousal from sleep was accepted as an abnormal finding.[33]

Increases in morning BP levels more than 15 mm Hg had been associated with both cerebrovascular, and cardiovascular events independent from office, and 24-hour BP measurements.[34, 35] Another study indicated abnormal increases in early morning BP as the strongest predictor of hypertension-related left ventricular hypertrophy.[36] In consideration of these data, many authors have proposed routine organization of ambulatory BP assessment programs to include evaluations of early morning increases in BP. In such BP control programs patients with early morning hypertension will be easily detected, and accordingly treatment of these patients will be properly adjusted. Thanks to this approach, it will be possible to apply more effective treatment, and obtain better clinical outcomes. As seen in our study, even if the office, 24-hour, and daytime mean BP measurements were under required cut-off values, they can be still in the risky group as assessed by their nighttime, and early morning BP values. At this stage failure to make any evaluation of BP, will cause omission of the risk, and inability to apply necessary therapeutical interventions.

In this study, if we remember that all the study population consisted of hypertensive patients under treatment, failure of the drugs to control increases in nighttime, and early morning BP values is noteworthy. Especially in most of the patients, mean office, and 24-hour blood pressure values were normal, however persistence of nighttime, and early morning hypertension demonstrates lack of 24-hour effectiveness of drugs used. Although effectiveness of drugs, and daily dosages during nighttime, and early morning hours were not compared, literature data reveal that RAAS inhibitors, and alpha adrenergic blockers are more efficacious at this respect.[37-39] At this point, traditional single dose drug use after breakfast should be questioned. Especially for patients requiring combination therapy, instead of fixed dose drug combination received in the morning, drug treatment in two divided doses taken separately in the morning, and at night or single dose at night instead of morning should be individually evaluated for each patient. Because of ack of any clear recommendations in guidelines and in the literature, individual evaluation should be made in consideration of clinical, and demographic characteristics of the patient, progression of BP, concomitant drugs used, drug interactions, and pharmacokinetic properties of the drug, and appropriate pharmacological treatment prescribed at suitable times will be reasonable. Although routine ambulatory BP monitorization is not recommended by guidelines, close monitorization of the prescribed therapy for its efficacy during 24-hour, and early morning efficacy appears to be a necessary approach for optimal risk modification. We think that literature data about gradually increasing use of ambulatory BP monitorization will find its reflection in the guidelines in near future.

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REFERENCES

1. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al.; Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National Heart, Lung, and Blood Institute; National High Blood Pressure Education Program Coordinating Committee. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Hypertension 2003;42:1206-52.
2. Onat A, Dursunoğlu D, Sansoy V, Dönmez K, Keleş 1, Ökçün B ve ark. Türk erişkinlerinde kan basıncında yeni eğilimler: TEKHARF çalışması 1990 ve 1995 verilerinin analizi. Türk Kardiyol Dern Arş 1996;24:73-81.
3. Altun B, Arici M, Nergizoğlu G, Derici U, Karatan O, Turgan C, et al.; for the Turkish Society of Hypertension and Renal Diseases. Prevalence, awareness, treatment and control of hypertension in Turkey (the PatenT study) in 2003. J Hypertens 2005;23:1817-23.
4. Arici M, Turgan C, Altun B, Sindel S, Erbay B, Derici U, et al.; Turkish Society of Hypertension and Renal Diseases. Hypertension incidence in Turkey (HinT): a population-based study. J Hypertens 2010;28:240-4.
5. Kearney PM, Whelton M, Reynolds K, Whelton PK, He J. Worldwide prevalence of hypertension: a systematic review. J Hypertens 2004;22:11-9.
6. Logan AG, Dunai A, McIsaac WJ, Irvine MJ, Tisler A. Attitudes of primary care physicians and their patients about home blood pressure monitoring in Ontario. J Hypertens 2008;26:446-52.
7. Mancia G, De Backer G, Dominiczak A, Cifkova R, Fagard R, Germano G, et al. 2007 Guidelines for the management of arterial hypertension: The Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). Eur Heart J 2007;28:1462-536.
8. Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). JAMA 2001;285:2486-97.
9. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet 2006;367:1747-57.
10. Mancia G, Laurent S, Agabiti-Rosei E, Ambrosioni E, Burnier M, Caulfield MJ, et al. Reappraisal of European guidelines on hypertension management: a European Society of Hypertension Task Force document. J Hypertens 2009;27:2121-58.
11. ACCORD Study Group, Cushman WC, Evans GW, Byington RP, Goff DC Jr, Grimm RH Jr, Cutler JA, et al. Effects of intensive blood-pressure control in type 2 diabetes mellitus. N Engl J Med 2010;362:1575-85.
12. Cooper-DeHoff RM, Gong Y, Handberg EM, Bavry AA, Denardo SJ, Bakris GL, et al. Tight blood pressure control and cardiovascular outcomes among hypertensive patients with diabetes and coronary artery disease. JAMA 2010;304:61-8.
13. Lamarre-Cliché M, Cheong NN, Larochelle P. Comparative assessment of four blood pressure measurement methods in hypertensives. Can J Cardiol 2011;27:455-60.
14. Powers BJ, Olsen MK, Smith VA, Woolson RF, Bosworth HB, Oddone EZ. Measuring blood pressure for decision making and quality reporting: where and how many measures? Ann Intern Med 2011;154:781-8.
15. Souza WK, Jardim PC, Porto LB, Araújo FA, Sousa AL, Salgado CM. Comparison and correlation between self-measured blood pressure, casual blood pressure measurement and ambulatory blood pressure monitoring. Arq Bras Cardiol 2011;97:148-55.
16. Mayor S. Hypertension diagnosis should be based on ambulatory blood pressure monitoring, NICE recommends. BMJ 2011;343:d5421.
17. Little P, Barnett J, Barnsley L, Marjoram J, Fitzgerald-Barron A, Mant D. Comparison of acceptability of and preferences for different methods of measuring blood pressure in primary care. BMJ 2002;325(7358):258-9.
18. National Heart Foundation and High Blood Pressure Research Council of Australia Ambulatory Blood Pressure Monitoring Consensus Committee. Ambulatory blood pressure monitoring. Aust Fam Physician 2011;40:877-80.
19. Bur A, Herkner H, Vlcek M, Woisetschläger C, Derhaschnig U, Hirschl MM. Classification of blood pressure levels by ambulatory blood pressure in hypertension. Hypertension 2002;40:817-22.
20. Wallis EJ, Ramsay LE, Jackson PR. Cardiovascular and coronary risk estimation in hypertension management. Heart 2002;88:306-12.
21. Agarwal R. Home and ambulatory blood pressure monitoring in chronic kidney disease. Curr Opin Nephrol Hypertens 2009;18:507-12.
22. Eguchi K. Ambulatory blood pressure monitoring in diabetes and obesity-a review. Int J Hypertens 2011;2011:954757.
23. Pierdomenico SD, Cuccurullo F Ambulatory blood pressure monitoring in type 2 diabetes and metabolic syndrome: a review. Blood Press Monit 2010;15:1-7.
24. Krakoff LR. Hypertension: Ambulatory blood-pressure monitoring has arrived. Nat Rev Cardiol 2011;8:671-2.
25. Ohkubo T, Hozawa A, Yamaguchi J, Kikuya M, Ohmori K, Michimata M, et al. Prognostic significance of the nocturnal decline in blood pressure in individuals with and without high 24-h blood pressure: the Ohasama study. J Hypertens 2002;20:2183-9.
26. Ohkubo T, Imai Y, Tsuji I, Nagai K, Watanabe N, Minami N, et al. Relation between nocturnal decline in blood pressure and mortality. The Ohasama Study. Am J Hypertens

1997;10:1201-7.
27. Verdecchia P, Schillaci G, Porcellati C. Dippers versus non-dippers. J Hypertens Suppl 1991;9:S42-4.
28. Ersoylu ZD, Tuğcu A, Yildirimtürk O, Aytekin V, Aytekin S. Comparison of the incidences of left ventricular hypertrophy left ventricular diastolic dysfunction, and arrhythmia between patients with dipper and non-dipper hypertension. Turk Kardiyol Dern Ars 2008;36:310-7.
29. Pickering TG. Morning hypertension. J Clin Hypertens (Greenwich) 2007;9:224-8.
30. Muller JE, Tofler GH, Stone PH. Circadian variation and triggers of onset of acute cardiovascular disease. Circulation 1989;79:733-43.
31. Panza JA, Epstein SE, Quyyumi AA. Circadian variation in vascular tone and its relation to alpha-sympathetic vasoconstrictor activity N Engl J Med 1991;325:986-90.
32. Nonaka H, Emoto N, Ikeda K, Fukuya H, Rohman MS, Raharjo SB, et al. Angiotensin II induces circadian gene expression of clock genes in cultured vascular smooth muscle cells. Circulation 2001;104:1746-8.
33. Kario K, White WB. Early morning hypertension: what does it contribute to overall cardiovascular risk assessment? J Am Soc Hypertens 2008;2:397-402.
34. Kario K, Pickering TG, Umeda Y, Hoshide S, Hoshide Y, Morinari M, et al. Morning surge in blood pressure as a predictor of silent and clinical cerebrovascular disease in elderly hypertensives: a prospective study Circulation 2003;107:1401-6.
35. Metoki H, Ohkubo T, Kikuya M, Asayama K, Obara T, Hashimoto J, et al. Prognostic significance for stroke of a morning pressor surge and a nocturnal blood pressure decline: the Ohasama study. Hypertension 2006;47:149-54.
36. Ikeda T, Gomi T, Shibuya Y, Matsuo K, Kosugi T, Oku N, et al. Morning rise in blood pressure is a predictor of left ventricular hypertrophy in treated hypertensive patients. Hypertens Res 2004;27:939-46.
37. Neutel JM. Ambulatory blood pressure monitoring to assess the comparative efficacy and duration of action of a novel new angiotensin II receptor blocker--telmisartan. Blood Press Suppl 2001;1:27-32.
38. Marfella R, Siniscalchi M, Nappo F, Gualdiero P, Esposito K, Sasso FC, et al. Regression of carotid atherosclerosis by control of morning blood pressure peak in newly diagnosed hypertensive patients. Am J Hypertens 2005;18:308-18.
39. Kario K, Matsui Y, Shibasaki S, Eguchi K, Ishikawa J, Hoshide S, et al. An alpha-adrenergic blocker titrated by self-measured blood pressure recordings lowered blood pressure and microalbuminuria in patients with morning hypertension: the Japan Morning Surge-1 Study. J Hypertens 2008;26:1257-65.

Anahtar sözcükler: Hipertansiyon; kan basıncı monitörizasyonu, ambulatuvar; risk değerlendirmesi; Türkiye; uygulama kılavuzu.

Key vvords: Hypertension; blood pressure monitoring, ambulatory; risk assessment; Turkey; practice guidelines as topic.