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Blood Pressure Control and Dipping Status In Overweighed and Obese Hypertensive Patients

Kilolu ve Şişman Hipertansif Hastalarda Kan Basıncı Kontrolü ve Dipping Durumu

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ABSTRACT

Objectives: Uncontrolled blood pressure and nondipping status are closely associated with increased cardiovascular risk. In this study we aimed to evaluate blood pressure control and dipping status in overweighed and obese hypertensive patients.

Material and method: Seventy two hypertensive patients (57.4±11.9; 21 male, 51 female) were enrolled. Patients were grouped as with BMI <25 kg/m2 and ≥25 kg/m2. Patients with diabetes and coronary artery disease were excluded. All of the patients were performed 24-hour ambulatory blood pressure monitoring. Averages of 24-hour, daytime and nighttime systolic, and diastolic blood pressures were calculated. Dipping feature was determined by the >10% decrease of blood pressures in the nighttime measurements compared to daytime measurements. Statistical analyses were done by Mann Whitney U test and Chi Square test using SPSS 11.0.

Results: 24 hour daytime and nighttime SBPs were significantly higher in overweighed and obese patients with the BMI ≥25 kg/m2 compared to patients with BMI <25 kg/m2 ($p<0.05$). Also DBPs were higher in the same group but not statistically significant ($p>0.05$). Distribution of dipping and nondipping was not different between groups, however nondipping status was increased in both of the groups.

Conclusions: Targets of optimal blood pressure in overweighed and obese hypertensive patients could not be

achieved. Thus hypertensive patients with BMI ≥25 kg/m2 are at risk for cerebrovascular and cardiovascular events due to higher daytime and nighttime blood pressure. Non dipping status is also higher in both groups. Blood pressures should be closely monitored and if necessary, combination therapy should be planned to achieve blood pressure targets and to overcome the nondipping status.

Key words: *Non dipping, Obesity, Body Mass Index, Hypertension*

ÖZET

Amaç: Kan basıncı kontrolünün olmaması ve nondipping durumu artmış kardiyovasküler risk ile ilişkilidir. Bu çalışmada kilolu ve şişman hipertansif hastalarda kan basıncı kontrolünü ve dipping durumunu incelemeyi amaçladık.

Materyal ve Metod: 72 hipertansif hasta (57,4±11,9; 21 erkek, 51 kadın) çalışmaya alındı. Hastalar VKİ <25 kg/m2 ve ≥25 kg/m2 olanlar şeklinde gruplandırıldı. Diyabet ve koroner arter hastalığı olanlar çalışmaya dahil edilmedi. Tüm hastalara 24 saatlik ambulatuvar kan basıncı monitorizasyonu yapıldı. 24 saatlik, gündüz ve gece döneminin sistolik ve diyastolik kan basıncı ortalamaları hesaplandı. Dipping durumu kan basıncının gece ölçümlerinde gündüz ölçümlerine göre %10 ve daha fazla düşüşü ile belirlendi. İstatistiki analizler Mann Whitney U testi ve Ki-kare testi ile SPSS 11.0 kullanılarak yapıldı.

Bulgular: 24 saat, gündüz ve gece sistolik kan basıncı BMI ≥25 kg/m2 olan kilolu ve şişman hastalarda BMI<25 kg/m2 olanlara göre anlamlı derecede yüksek bulundu ($p<0.05$). Diyastolik kan basınçları da aynı grupta yüksek izlendi ancak istatistki olarak anlamlı değildi ($p>0.05$). Dipping ve nondipping durumunun dağılımı gruplar arasında farklı değildi ancak non dipping durumu her iki grupta da artmış olarak izlendi.

Sonuçlar: Optimal kan basıncı hedefleri kilolu ve şişman hastalarda sağlanabilmiş değildir. Dolayısı ile BMI ≥25 kg/m2 olan hipertansif hastalar yüksek gündüz ve gece kan basınçlarından dolayı serebrovasküler ve kardiyovasküler olaylar açısından risk altındadırlar. Nondipping durumu her iki grupta da yüksektir. Kan basınçları yakından takip edilmeli gerekirse kan basıncı hedeflerine ulaşmak ve nondipping durumu düzeltmek için kombinasyon tedavisi planlanmalıdır.

Anahtar Kelimeler: *Nondipping, Obezite, Vücut kitle indeksi, Hipertansiyon*

INTRODUCTION

Obesity and overweight became a major public health with an increasing prevalence for the last two decades (1). Obesity and also overweight contribute the increasing burden of hypertension and interferes with the awareness, treatment, and control of hypertension (2). Obesity is one of the components of metabolic syndromes and potentially has the risk to develop type 2 diabetes due to insulin resistance. Since it is closely related with cardiovascular complications in further period of life, optimal blood pressure levels are similar to those recommended in patients with type 2 diabetes (3).

There is general agreement that the tight blood pressure control in obese patients aids to achieve lowering cardiovascular complications. However optimal blood pressure control could not be achieved in the management of hypertension yet. Multiple factors may lay out that common problem observed in the hypertensive patients (2). Diurnal variation of blood pressure (BP) is a physiological process in human body. Dipping feature of hypertensive patient is a physiological response and also defines the nocturnal reduction of BP more than 10%. However non dipping condition is an abnormal diurnal BP variation with a reduction of BP in night less than 10%.

In this study we evaluated obese, overweighed, and non obese hypertensive patients by ambulatory blood pressure monitoring. We aimed to determine whether the optimal blood pressure could be achieved in patients with BMI ≥25 kg/m2. Also we evaluated the non dipping condition, which could render patients at risk for vascular complications, in obese and overweighed patients.

MATERIAL AND METHOD

Seventy two hypertensive patients (57.4±11.9; 21 male, 51 female) were enrolled to the study. Patients who have been followed up for primary hypertension were recruited for a routine control and voluntarily underwent 24 hour ambulatory blood pressure monitoring. Patients were informed and signed written informed consent form. Patients with diabetes and coronary artery disease, etc. were excluded. Body weight was measured with the subjects in light clothing without shoes and at a 12 hour fasting state in the morning. BMI was calculated as weight/height (kg/m2).

All subjects underwent 24-hour ambulatory blood pressure monitoring on a usual daily activity. They were instructed to go on their routine daily activities. An appropriate sized cuff was placed around the nondominant arm. Measurement of blood pressure at 15-minute intervals throughout the 24-hour study period was planned. 80 to 90 pairs of systolic and diastolic blood pressure recordings with its simultaneous time data were documented and transferred to computer. All subjects were instructed to rest or sleep between 10:00 pm and 06:00 am (nighttime) and to maintain their usual activity at 06:00 am and 10:00 pm. Subjects working at night shift were excluded. Dipping condition was determined by the 10% decrease of blood pressures in the night measurements compared to day measurements. Total, day and night systolic, and diastolic blood pressures were obtained from the 24 hour measurements. Statistical analysis was performed by Mann Whitney U test and Chi Square test using SPSS 11.0 for Windows.

RESULTS

Demographic features were compared between obese and overweighed patients with BMI ≥25kg/m2 and lean patients with BMI < 25 kg/m2. The data are listed in table 1. Averages of 24 hour, daytime and nighttime systolic and diastolic blood pressures, dipping and nondipping features were compared between the obese and overweighed patients with BMI ≥25kg/m2 and lean patients with BMI < 25 kg/m2. Averages of 24-hour, daytime and nighttime SBPs were significantly higher in patients with BMI >25 kg/m2 ($p<0.05$). Averages of 24-hour, daytime and nighttime DBPs were higher in patients with BMI ≥25 kg/m2 but not statistically significant ($p>0.05$). Additionally we could not observed any statistical difference about the distribution of dipping and nondipping status between the obese and overweighed patients with BMI ≥25kg/m2 and lean patients with BMI < 25 kg/m2 ($p>0.05$). Predominance of non dipping status in both of the groups was a significant finding which should be avoided.

DISCUSSION

Epidemiological studies alert the increasing prevalence of obesity worldwide (4). Although the definition of essential hypertension indicates the lack of any particular mechanism accounted for the high blood pressure values, overweight and obesity may be proposed as an etiological factor for hypertension (5,6). Coinciding obesity with hypertension may additionally increase the cardiovascular risk of patients, because obesity is an integral part of metabolic syndrome and impact as the diabetes did. Insulin resistance and sympathetic overactivity; the key elements of obesity and diabetes, promotes the progress of atherosclerosis (6, 7). Thus weight reduction is strictly suggested for the control of diabetes and

hypertension (8). 24 hour ambulatory blood pressure monitoring is one of the widely used and effective methods for the diagnosis and the assessment of the efficacy of antihypertensive treatment. It may also help predicting coronary and cerebrovascular morbidity and mortality due to uncontrolled hypertension (9). It was reported that 24 hour daytime and nighttime average blood pressure values correlate with subclinical organ damage more closely than official values (10). Kotsis et al. reported that BMI is closely associated with increased ambulatory blood pressure parameters in patients with overweighed and obese. Also they reported that obesity abnormally impact the circadian blood pressure alteration and caused the nondipping status in hypertensive patients (11). However their study population was composed of newly diagnosed hypertensive patients who were never treated with antihypertensive medication. In this study we aimed to evaluate the impact of obesity on blood pressure control of hypertensive patients taking medication.

In our study we observed that averages of ambulatory 24-hour, daytime, and nighttime systolic blood pressures are significantly higher in patients with BMI ≥25 kg/m2. Also 24-hour ambulatory daytime, nighttime diastolic blood pressures were higher but statistically insignificant in patients with BMI ≥25 kg/m2. Although it was suggested that optimal blood pressure values which were currently defined in guidelines to be 120/80 mm Hg for obese patients as in diabetic patients (3). Blood pressure targets could not be achieved in obese patients. We can conclude that blood pressure control is an important problem which could render the obese and overweighed hypertensive patients potentially at risk for cerebrovascular and cardiovascular events. Factors that challenge the blood pressure control in obese and overweighed hypertensive patients should be determined. Awareness, lack of salt restriction, abnormal eating habits, and lack of endeavor to lose body weight are probably accounted for the uncontrolled blood pressure. Also ambulatory blood pressure monitoring could be performed more frequently in order to determine the blood pressure control. Combination drug therapy rather than monotherapy for treatment of hypertension should be preferred. Obesity and overweight are not only identifiable causes of hypertension (12) but also risk factors for uncontrolled hypertension despite an antihypertensive medication. Thus obesity or overweight of a hypertensive patient should alert physician for a possible uncontrolled blood pressure. Losing weight; which could potentially be effective in two ways, should be strictly encouraged in obese hypertensive patients. One mechanism is that the lowering body weight may cause a reduction in blood pressure, second is that the frequency of sleep apnea will reduce by losing weight.

Sleep apnea is also one of the identifiable causes of hypertension. Also obese patients may exhibit sleep apnea. During sleep it should be observed a decline in blood pressure in normal-weight subjects; however sleep apnea might be an interrupting factor for the control of blood pressure. Impact of sleep apnea could be observed not only on nighttime blood pressures but also on daytime blood pressure (13,14). Subjects with blunted of nocturnal decrease in blood pressure have a worse prognosis than other hypertensive patients (15). We did not exclude the obese patients suffering sleep apnea and this could be a limitation of our study. But this issue should be sought in obese patients who could not achieve blood pressure targets. It was documented that treatment of obstructive sleep apnea improved hypertension and quality of life (16). When we compared the distribution of dipper and non dipper status between obese and overweighed and lean hypertensives, we did not observe any difference between groups. But the non dipping status was predominant in each group compared to dipping. The point that should be emphasized is higher rates of

non dipping status in both groups. Non dipping status is associated with a higher incidence of cardiovascular target organ damage and poorer prognosis for cardiovascular events in comparison to dippers (17,18). This finding of predominance of nondipping feature may be induced by the antihypertensive medication which was not planned meticulously. Modification of antihypertensive medication and preference of combination therapy rather than monotherapy may reduce and control the elevation in the daytime and especially nighttime blood pressures. Increased BMI and uncontrolled blood pressures are the contributing factors for the macrovascular and microvascular complications independently of diabetes (19).

In this study we did not evaluate the differences of official blood pressure between obese and lean patients since there were many previous studies which reported that white coat hypertension was common in obese patients (20). Limited number of patients of this study could be a limitation. But the conclusion is important enough to take the attention to unachieved blood pressure targets in obese hypertensive patients. So we suggest that the blood pressure target and its challenging and contributing factors, and also medications preferences in overweighed and obese hypertensive patients should be sought in large populated study projects.

Targets for optimal blood pressures in overweighed and obese hypertensive patients could not be achieved. Factors that could adversely affect blood pressure control in overweighed and obese hypertensives should be sought and treated. Non dipping status is higher in both obese-overweighed and lean patients despite the antihypertensive medication. Those abnormal findings inevitably increase risk for cardiovascular morbidity and mortality in overweighed and obese patients.

Table 1: *Comparison of averages of 24-hour, daytime and nighttime systolic blood pressures and diastolic blood pressures between the overweighed and obese (BMI≥25 kg/m2) hypertensive patients and lean (BMI<25 kg/m2) hypertensive patients*

Blood pressure averages	BMI <25 (n=15)	BMI >25 (n=57)	*P* değeri
24-hour SBP	125.2±7.4	135.6±16.1	<0.05
24-hour DBP	81.5±7.6	85.8±13.1	>0.05
Daytime SBP	127.2±10.1	138.3±15.4	<0.05
Daytime DBP	83.9±10.5	88.5±13.2	>0.05
Nighttime SBP	121.0±7.7	130.7±19.3	<0.05
Nighttime DBP	76.9±6.1	80.8±13.9	>0.05

BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure

Table 2: *Distribution of dipper and non dipper status among overweighed and obese (BMI≥25 kg/m2) hypertensive patients and lean (BMI<25 kg/m2) hypertensive patients*

	Dipping	Nondipping	P value
BMI <25 kg/m^2 (n=15)	n=3 % 20	n=12 %80	>0.05
BMI ≥25 kg/m^2 (n=5)	n=13 % 22.8	n=44 %77.2	

BMI; Body mass index

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