Serum Lipids in Patients with White Coat Hypertension

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Abstract

Aim: Serum lipid levels were investigated in white coat hypertension in comparison with essential hypertension and normotension.

Material and Methods: We selected three groups of patients, 40 essential hypertensives, 40 white coat hypertensives, and 40 normotensives. Blood samples were taken in the morning from peripheral veins after 12 hours fasting period. Plasma concentrations of total cholesterol, triglycerides, high-density lipoprotein (HDL) cholesterol, and glucose were determined by the enzymatic dry chemistry method using a Behring apparatus. Low-density lipoprotein (LDL) cholesterol values were computed according to the Friedewald formula.

Results: Mean office blood pressure values were significantly higher in hypertensive patients and white coat hypertensive patients than those of control subjects ($p < 0.001$). Mean ambulatory blood pressure monitoring values were significantly higher in hypertensive patients than those of white coat hypertensives patients and control subjects but they were similar in white coat hypertensives patients and control subjects ($p < 0.001$ and $p > 0.05$, respectively). Total cholesterol and triglycerides levels were slightly higher in patients with hypertensive patients than white coat hypertensives and control groups, but this different was not significant statistically ($p = 0.07$). Plasma HDL cholesterol, LDL cholesterol and glucose levels were not significantly different in each group ($p > 0.05$).

Conclusion: Our data demonstrate that white coat hypertensive patients present similar lipid profile to normotensive people, so in our opinion, the white coat hypertension is a benign condition.

Key Words: White Coat; Hypertension; Serum Lipids.

Beyaz Önlük Hipertansiyonlu Hastalarda Serum Lipit Değerleri

Özet

Amaç: Beyaz önlük hastalarında serum lipitlerini değerlendirilip esansiyel hipertansiyonlu ve normal tansiyonlularla karşılaştırmak.

Gereç ve Yöntem: Üç grup hasta seçtik: 40 esansiyel hipertansiyonlu, 40 beyaz önlük hipertansiyonu ve 40 normal tansiyonlu. Kan örnekleri 12 saatlik açlık sonrası sabahleyin periferik venlerden alındı. Plazma total kolesterol, trigliserit, yüksek yoğunluklu lipoprotein (HDL) kolesterol ve glukoz değerleri Behring cihazı kullanılarak kuru kimyasal enzimatik yolla saptandı. Düşük yoğunluklu lipoprotein (LDL) kolesterol Friedewald formülü kullanılarak hesaplandı.

Bulgular: Ortalama ofis kan basıncı değerleri hipertansiyonlu ve beyaz önlük hipertansiyonlu hastalarda kontrol grubuna göre anlamlı olarak yüksek bulundu ($p < 0.001$). Ortalama ambulatuvar kan basıncı değerleri hipertansiyonlu hastalarda beyaz önlük hipertansiyonlu hastalar ve kontrol grubundan anlamlı olarak yüksek bulunurken, beyaz önlük hipertansiyonlu hastalar ile kontrol grubundaki değerler ise benzerdi ($p < 0.001$ ve $p > 0.05$, sırasıyla). Total kolesterol ve trigliserit seviyeleri hipertansiyonlu hastalarda beyaz önlük hipertansiyonlularına ve kontrol grubuna göre hafifçe yüksekti, fakat aradaki bu fark istatistiksel olarak anlamlı değildi ($p = 0.07$). Plazma HDL kolesterol, LDL kolesterol ve glukoz düzeyleri her grup için anlamlı farklı değildi ($p > 0.05$).

Sonuç: Bizim verilerimize göre beyaz önlük hipertansiyonlu hastalar normal tansiyonlu insanlarla benzer lipit profiline sahiptirler ve bize göre beyaz önlük hipertansiyonu iyi huylu bir durumdur.

Anahtar Kelimeler: Beyaz Önlük; Hipertansiyon; Serum Lipitleri.

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Introduction

White-coat hypertension (WCH) is a condition characterized by a persistently raised blood pressure (BP) in the clinical setting in combination with a normal daytime ambulatory BP, in contrast to essential hypertension (EH), where an elevated BP is found both at office and ambulatory readings (1). The clinical relevance of WCH is not established, and the question of whether this condition involves an increased cardiovascular risk remains controversial. Results from cross-sectional studies have been contradictory; some indicate an association between WCH and hypertensive target organ damage (2,3), whereas others do not (4,5).

Metabolic risk factors related to hypertension contribute to the development of hypertensive target organ damage and atherosclerotic diseases. Hypertension is associated with an abnormal glucose metabolism and dyslipidemia, and insulin resistance may precede hypertension (6). Although previous studies have indicated metabolic disturbances in WCH subjects, the results are inconsistent (7). The present study was designed to investigate serum total cholesterol, LDL cholesterol, HDL cholesterol and triglycerides in subjects with WCH compared with subjects with normotension and those with essential hypertension.

Material and Methods

The 40 newly diagnosed, never-treated patients with EH, 40 patients with WCH and 40 healthy volunteers were included in the study. Exclusion criteria were the use of antihypertensive or other drugs, smoking, diabetes, obesity, secondary hypertension, renal failure, ischemic heart disease, peripheral vascular disease, gastrointestinal disease, systemic illness and recent history of infection (within the last one month). The study was in accordance with the Second Declaration of Helsinki and was approved by Institutional Review Board and all subjects gave their informed consent.

Blood pressure (BP) was measured with a mercury sphygmomanometer with an appropriate cuff for arm's circumference at the medical office. After 5-

10 minute resting period, the measurements were taken from the patient's bare right arm, which was supported and maintained at the heart level. Three measurements were taken and averaged as the mean systolic and diastolic pressure values.

Ambulatory blood pressure monitoring (ABPM) was performed with a portable noninvasive, an oscillometric device (SpaceLabs 92512, Redmond WA) on a daily activity. ABPM readings were obtained at 15-min intervals from 6 AM to midnight, and at 30-min intervals from midnight to 6 AM. The recording valid for analysis had a minimum duration of 24 hours and 80 valid readings, corresponding to at least 80% of all measurements. WCH was defined as systolic BP ≥140 mm Hg and diastolic ≥90 mm Hg in office setting and as an average daytime systolic BP <135 mm Hg and diastolic BP <85 mm Hg in ABPM.

Blood samples were taken in the morning (between 08:00 and 10:00 AM) from peripheral veins after a 12 hours fasting period and collected in ice-cold vacuum glass tubes containing citric acid. All subjects rested at least 5-10 minutes in supine position before blood sampling. Plasma concentrations of total cholesterol, fasting triglycerides, high-density lipoprotein (HDL) cholesterol, and glucose were determined by the enzymatic dry chemistry method using a Behring apparatus. Low-density lipoprotein (LDL) cholesterol values were computed according to the Friedewald formula.

Data are expressed as mean ± standard deviation (SD). The three groups were compared by one-way ANOVA analysis. A value of p<0.05 was considered significant. Data were analyzed with SPSS (SPSS Inc, Chicago, Illinois, USA).

Results

Total of 120 patients were included in the study. WCH group consisted of 15 men and 25 women (mean age: 44.4±6.6 years), EH group consisted of 22 men and 18 women (mean age: 44.3±6.2 years), and the control group consisted of 19 men and 21 women (mean age: 42.4±5.4 years). The general characteristics and BP values of study population are shown in Table 1. The numbers of female patients were slightly higher than men in the WCH group but this difference was not significant

statistically. The average of age was similar in both three groups.

Office BP was significantly higher in EH and in WCH subjects than in normotensives; it was also slightly but not significantly higher in EH than in WCH subjects (p<0.001, p>0.05 respectively). Mean Ambulatory BP values were significantly higher in EH patients than those of WCH patients and control subjects but it was similar in WCH patients and control subjects (p<0.001, p>0.05, respectively). Mean office BP and Ambulatory BP values of study population were shown in Table 1. Laboratory findings were reported in Table 2. Total cholesterol was slightly higher in the essential hypertensive than in the normotensive subjects, but there was no difference between the essential hypertensive and the white coat hypertensive subjects or between the white coat hypertensive and the normotensive subjects (p=0.07). Triglyceride values and prevalence of hypertriglyceridemia were slightly greater in the essential hypertension group than in the white coat hypertension and normotension groups (p=0.06); however, there was no difference between the white coat hypertensive and the normotensive subjects. But all differences were not significant statistically (p>0.05).

Table 1. Characteristics and office blood pressure and ambulatory blood pressure monitoring data of study population.

Parameter	Essential hypertension $n=40$	White coat hypertension $n=40$	Control patients $n=40$
Age (years)	44,4±6,6	44,3±6,3	42,4±5,4
Male/Female	22/18	15/25	19/21
BMI (kg/m²)	28,9±2,5	28,7±2,4	25,7±2,5
Office systolic	154±10,6*	150,6±6,9*	128,2±6,5
Office diastolic	96,3±6,5*	95±6,6*	76,2±5,4
Daytime systolic	148±5,8**	130,9±2,9	124,6±4,9
Daytime diastolic	94±3,9**	79,6±3,4	72,6±5,4
Nighttime systolic	136±4,2**	122,1±4,2	115±5,8
Nighttime diastolic	84,1±5,4**	71,8±5,2	63,4±3,2
24-h systolic	141,5±3,4**	127,8±3,3	121,2±4,6
24-h diastolic	89,2±2,8**	77,5±3,6	69±3,3

BMI: Body Mass Index;
*p<0,001 versus control patients.
**p<0,001 versus patients with white coat hypertension and control

Table 2. Laboratory findings of study groups.

Parameter	Essential hypertension $n=40$	White coat hypertension $n=40$	Control patients $n=40$
Glucose (mg/dL)	88,3±7,8*	87,5±7,9	85±9,1
Total cholesterol (mg/dL)	206,1±25,2*	202,1±23,8	191±17,7
HDL cholesterol (mg/dL)	40.4±5,2*	42,4±4,6	43±3,4
LDL cholesterol (mg/dL)	124,1±19,9*	119±16,8	105±15,4
Triglycerides (mg/dL)	183,6±28*	181,6±23,8	174,2±17,3

HDL: High-Density Lipoprotein; LDL: Low-Density Lipoprotein.
*p>0.05 all groups

Discussion

In the present study, we evaluated total cholesterol, HDL cholesterol, LDL cholesterol and triglyceride levels in essential hypertensive, white-coat hypertensive, and normotensive subjects. Our data show that essential hypertensives have slightly higher but not statistically significant total cholesterol and triglycerides levels than control subjects, whereas we did not find difference between white coat hypertensives and control subjects.

Some authors (8,9) have reported that white coat hypertensive patients do not show cardiac damage, whereas others (10-12) have suggested that white coat hypertension should not be considered an entirely innocuous condition. Previous studies investigating the serum lipid levels in EH and WCH patients were conflicting.

Pierdomenico et al. (4) reported that serum glucose, creatinine, total cholesterol, HDL cholesterol, LDL cholesterol and triglyceride levels were not different significantly between WCH and normotensive patients. Our findings were in accordance with this study.

Julius et al. (7) suggested that WCH patients may be characterized by a lipid profile similar to that in sustained hypertensive patients, which includes low HDL cholesterol and high triglyceride values that could increase their cardiovascular risk.

Helvacı et al. (13) reported that dyslipidemia had a higher prevalence in the WCH group compared to the hypertensive group. They found that the prevalence of dyslipidemia was higher in the WCH group (41.6%) than the normotensive group (19.6%) and the hypertensive group (35.5%)

Mancia et al. (14) reported that patients with masked or WCH have an increased risk of abnormalities affecting their glucose and lipid profiles.

In another study, Yoon et al. (15) reported that metabolic risk factors were more frequent in patients with WCH, masked hypertension, and uncontrolled hypertension than in patients with controlled hypertension. Our results were different from these studies. These discrepancies may depend on different populations studied, dietetic and smoking habits, sample size, and the exclusion of diabetic patients from our study.

Our study had several limitations. First, only a small number of subjects were included in the study. Second, we excluded subjects with smoking, diabetes, obesity, secondary hypertension, renal failure, ischemic heart disease, and peripheral vascular disease and therefore our findings could not be extrapolated to all WCH patients. Finally, patients were included from Turkey, white population, and our results may not be generalized to all world.

In conclusion, our data demonstrated that white coat hypertensives do not present an unfavorable lipid profile, suggesting that they might be counseled on nonpharmacological therapy and that drug treatment could be withheld or delayed. We suggested that white coat hypertensive patients were at low cardiovascular risk. However, our overall findings should be supported by further large scale studies.

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