

DESPITE LIMITED BENEFIT, FUNDUSCOPIC EXAMINATION SHOULD BE CONTINUED FOR HYPERTENSION

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ÖZET

Amaç: Hipertansiyon (HT), ciddi kardiyovasküler olay riskini arttırmaktadır, bu sebeple kan basıncı kontrolü kardiyovasküler hastalıkların önlenmesinde ana unsurdur.

Metotlar: Çalışma, İç Hastalıkları Polikliniğinde ardı sıra başvuran normal tansiyon (NT) vakası ve HT hastalarında yapıldı.

Sonuçlar: Yetmiş dört NT vakası ve 46 HT hastası çalışmaya alındı. Gruplar arasında ortalama yaş, cinsiyet ve sigara, diyabet, hiperbetalipoproteinemi ve dislipidemi prevalansları açısından istatistiksel olarak anlamlı bir farklılık yoktu. Ancak obezite (%27.0'a karşılık %54.3, $p<0.001$) ve hipertrigliseridemi (%13.5'e karşılık %28.2, $p<0.01$) prevalansları HT grubunda anlamlı şekilde yüksekti. Her iki grupta da hiçbir grade III veya IV hipertansif retinopati (HR) vakasına rastlanmadı. Gruplar arasındaki fark grade I HR prevalansı açısından anlamsızdı, ancak grade 0 HR prevalansı HT grubunda anlamlı şekilde düşük iken (%55.4'e karşılık %32.6, $p<0.01$), grade II HR prevalansı anlamlı şekilde yüksekti (%4.0'a karşılık %13.0, $p<0.01$).

Özet: Her ne kadar HR, HT'a spesifik bir bulgu değilse de, HT grubunda tespit edilen grade 0 HR prevalansının anlamlı düşüklüğü ve grade II HR prevalansının anlamlı yüksekliği HT'un göz damarlanması üzerine olan etkilerini göstermekte ve bu alanda mevcut kullanılabilir takip parametreleri sayısının kısıtlı olması nedeniyle muhtemel faydasına işaret etmektedir. Ek olarak, her ne kadar toplumdaki insidanslarının düşük olması ve ilave ateroskleroz zeminlerine rağmen, grade III ve IV HR'nin HT için, özellikle de hipertansif krizler için spesifitesi muhtemelen yüksektir. Bu sebeple, her ne kadar faydası kısıtlıysa da yeni bazı daha etkili takip kriterlerinin bulunmasına kadar HT hastalarının tanı ve takibinde göz dibi muayenesine devam edilmelidir.

Anahtar kelimeler: Hipertansiyon, hipertansif retinopati, göz dibi muayenesi

SUMMARY

Background: Hypertension (HT) increases risks of major cardiovascular events, thus blood pressure control is the mainstay for prevention of cardiovascular diseases.

Methods: The study was performed on consecutive check up patients with normotension (NT) and HT in Internal Medicine Polyclinic.

Results: We studied 74 cases with NT and 46 with HT. There were nonsignificant differences according to the mean age, gender distribution, and prevalences of smoking, diabetes mellitus, hyperbetalipoproteinemia, and dyslipidemia between the groups, whereas prevalences of obesity (27.0% versus 54.3%, $p<0.001$) and hypertriglyceridemia (13.5% versus 28.2%, $p<0.01$) were significantly higher in the HT group. No case of grade III or IV hypertensive retinopathy (HR) was detected in any group. Differences were nonsignificant according to prevalence of grade I HR whereas grade 0 HR was significantly lower (55.4% versus 32.6%, $p<0.01$) and grade II HR was significantly higher (4.0% versus 13.0%, $p<0.01$) in the HT group.

Conclusion: Although HR is not a specific sign of HT, the significantly lower prevalence of grade 0 and significantly higher prevalence of grade II HRs in the HT group indicate the effects of HT on retinal vasculature, and probable benefits of funduscopy examination in management of HT due to limited number of available parameters in this field. Additionally, although the lower incidences and even additional atherosclerotic backgrounds of grade III and IV HRs, their specificities for HT are probably higher, particularly for hypertensive crises. Therefore, although limited benefit, funduscopy examination should be continued for HT until demonstration of some more accurate follow up criteria.

Key words: Hypertension, hypertensive retinopathy, funduscopy examination

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INTRODUCTION

Hypertension (HT) is one of the most important risk factors of mortality (1), and it affects majority of elders in the world (2-4). Thus blood pressure (BP) control is the mainstay for prevention of cardiovascular diseases, including myocardial infarction, cardiomyopathy, heart failure, peripheral artery disease, dissecting aortic aneurysm, and stroke. But management of HT is difficult due to fact that BP varies greatly depending on various stresses. Additionally, elder individuals tend to have an abnormal circadian rhythm and a normally higher systolic BP. Beside them, in doctor's office in particular, measurements are often too high, which is called as white coat hypertension (WCH), and prognostic significance of WCH remains unclear (5-7). Masked HT is another handicap of the office blood pressure (OBP) measurements, in which although the normal OBP values, home blood pressure (HBP) measurements are high, and it may even be together with already existing sequelae of HT (5). So conventional BP measurements may not identify some individuals at high or low risk for HT, and some additional supplementary procedures are required for the diagnosis and management of HT.

Although the whole afferent vasculature of body is probably affected from HT, one of the obvious results can be seen in eyes, and funduscopy examination is regularly performed to evaluate the effectiveness of antihypertensive therapies. Keith, Wagener, and Barker (KWB) classification of hypertensive retinopathy (HR) is used to define funduscopy findings, currently (8). By this way, beside the evaluation of effectiveness of the therapies, we can also catch some overlooked cases of HT. But there are various reports about the benefit of this procedure. We tried to understand significance of funduscopy examination for HT in the study.

MATERIAL AND METHODS

The study was performed on routine check up cases in the Internal Medicine Polyclinic of the Mustafa Kemal University between January and June 2010. We took consecutive patients aged between 35 and 70

years to be able to see the possible consequences of HT on retinal vasculature and to avoid debility induced weight loss in elders. Their medical histories including smoking habit and already used medications were learnt, and a routine check up procedure including fasting plasma glucose (FPG), low density lipoprotein cholesterol (LDL-C), triglyceride (TG), and high density lipoprotein cholesterol (HDL-C) was performed. Current regular smokers at least for 6 months and cases with a previous smoking history of at least five pack-years were accepted as smokers, and cigar and pipe smokers were excluded. Insulin using diabetics and patients with devastating illnesses including malignancies, acute or chronic renal failure, chronic liver diseases, hyper- or hypothyroidism, and heart failure were excluded to avoid their possible effects on weight. Body mass index (BMI) of each case was calculated by the measurements of the same physician instead of verbal expressions. Weight in kilograms is divided by height in meters squared, and obesity is defined as a BMI of 30 kg/m² or greater (9). OBP was checked after a 5-minute of rest in the seated position with a mercury sphygmomanometer, and no smoking was permitted during the previous 2-hour. A 14-day twice daily measurements of HBP was obtained in all cases (10), even in normotensives in the office due to the risk of masked HT after a 10-minute education about proper BP measurement techniques. A 24-hour ambulatory blood pressure monitoring (ABPM) was not required due to its equal effectiveness with HBP measurements (3). HT was defined as a BP of 135/85 mmHg or greater on mean HBP measurements, and cases were subdivided into the normotension (NT) and HT groups. Cases with an overnight FPG level of greater than 125 mg/dL on two occasions or cases already taking antidiabetic medications were defined as diabetics. An oral glucose tolerance test with 75-gram glucose was performed in cases with a FPG level between 110 and 126 mg/dL, and diagnosis of cases with a 2-hour plasma glucose level of 200 mg/dL or higher is diabetes mellitus (DM). Additionally, patients with dyslipidemia were detected, and we used the National Cholesterol Education Program

Expert Panel’s recommendations for defining dyslipidemic subgroups (9). Dyslipidemia is diagnosed when LDL-C is 160 or greater or TG is 200 or greater, or HDL-C is lower than 40 mg/dL. Funduscopy examination was performed via +90D lenses containing biomicroscope by the same ophthalmologist with or without dilatation of pupil according to severity of cases. The ophthalmologist was blind about the patients’ subclassifications to prevent observer bias. HR was assessed according to KWB classification, and graded as shown in Table 1. Prevalences of smoking, obesity, DM, hyperbetalipoproteinemia, hypertriglyceridemia, dyslipidemia, and grades of HR were found in each group and compared in between. Mann-Whitney U test, Independent-Samples T test, and comparison of proportions were used as the methods of statistical analyses.

RESULTS

We studied 74 cases with NT and 46 with HT. Characteristic features of the study cases were shown in Table 2. There were nonsignificant differences according to the mean age, gender distribution, and prevalences of smoking, DM, hyperbetalipoproteinemia, and dyslipidemia between the groups, whereas differences were significant according to the prevalences of hypertriglyceridemia (13.5% versus 28.2%, $p<0.01$) and obesity (27.0% versus 54.3%, $p<0.001$), and both of which were higher in the HT group. The significant relationships between HT, hypertriglyceridemia, and obesity are probably components of the metabolic syndrome. No case of grade III or IV HRs was detected in any group.

Table 1: Keith, Wagener, and Barker classification of hypertensive retinopathy

Grade I	Arteriolar diameter less than 50% of venous diameter
Grade II	Arteriovenous crossings located at more than one papillary diameter from the papilla
Grade III	Retinal hemorrhages or exudates
Grade IV	Papillary edema with retinal hemorrhages or exudates

Differences were nonsignificant according to prevalence of grade I HR (40.5% versus 54.3%, $p>0.05$), whereas grade 0 HR was significantly lower (55.4% versus 32.6%, $p<0.01$) and grade II HR was significantly higher (4.0% versus 13.0%, $p<0.01$) in the HT group (Table 2).

Table 2: Comparison of the normotensive and hypertensive cases

Variables	Normotension cases	Hypertension cases	p-value
Number	74	46	
Mean age (year)	54.7 ± 8.1 (36-75)	58.3 ± 10.8 (36-79)	ns*
Female ratio	55.4 % (41)	63.0 % (29)	ns
Prevalence of smoking	25.6 % (19)	21.7 % (10)	ns
Prevalence of obesity	27.0 % (20)	54.3 % (25)	<0.001
Prevalence of diabetes mellitus	24.3 % (18)	34.7 % (16)	ns
Prevalence of hyperbetalipoproteinemia	14.8 % (11)	10.8 % (5)	ns
Prevalence of hypertriglyceridemia	13.5 % (10)	28.2 % (13)	<0.01
Prevalence of dyslipidemia	24.3 % (18)	32.6 % (15)	ns
Prevalence of grade 0 HR†	55.4 % (41)	32.6 % (15)	<0.01
Prevalence of grade I HR	40.5 % (30)	54.3 % (25)	ns
Prevalence of grade II HR	4.0 % (3)	13.0 % (6)	<0.01

*Nonsignificant ($p>0.05$) †Hypertensive retinopathy

DISCUSSION

Cardiovascular diseases are the most common causes of deaths, particularly in developed countries (11), and most of them are related with HT (1). On the other hand, there are only a few parameters for the management of HT. Currently available quantitative markers of target organ damage (TOD) of HT are echocardiographically determined left ventricular hypertrophy (LVH), retinal microvascular changes,

ultrasonographically determined carotid intima-media thickness (IMT), and microalbuminuria, and there are various reports about the efficacies of them.

Funduscopy examination according to classification of KWB is used to assess retinal damage in HT since 1939. But again there are various reports about benefits of the procedure. In one side, due to the high prevalences of retinal arteriosclerosis in untreated subjects with mild HT, it could not be considered as a proof of TOD in HT (12). Additionally, association of retinopathy with other predictive parameters of TOD was inconsistent, and its association with cardiovascular complications was weak (13). Parallel to our results, all abnormalities were mild (Grades I and II of KWB), which also caused some diagnostic difficulties to distinguish normal from pathological ones in another study (14). Similarly, severity of HT did not vary parallel to the grades I and II of KWB, and positive and negative predictive values of any fundoscopic abnormality to estimate the severity of HT were 59% and 60%, respectively (15). In the other side, although methods of ultrasonographic measurements of carotid IMT are not globally standardized, and it remains unclear whether conventional measurement of IMT represents TOD of HT, age and IMT were significantly associated with albuminuria, retinal arteriosclerosis, and left ventricular mass index in another study (16). Similarly, a multiple stepwise regression analysis showed that microalbuminuria depended on the following factors in nondiabetic but hypertensive patients: systolic BP, retinopathy, coronary heart disease, diastolic BP, and LVH in order of importance ($p < 0.0001$ for all) (17). Additionally, degree of retinopathy was highly correlated with a mean 24-hour ABPM ($r = 0.31$; $p < 0.0001$), and left ventricular mass index was correlated with ABPM values but with a lower level of significance ($r = 0.19$; $p < 0.001$) compared to the degree of retinopathy (18). So ophthalmoscopy proved to be more sensitive than echocardiography in indexing 24-hour ABPM load while the more expensive echocardiography is not of great clinical value in borderline and mild HT cases (18). By using the Scheie's staging system,

TOD of HT was found as an important factor for retinopathy in another study (19). Similarly, prevalences of grade I and II HRs were higher and grade 0 HR was lower in the HT group ($p < 0.001$ for all) in a previous study of us (20).

As another supplementary finding to the hypertensive background of the retinopathy, there was no sign of persistent angiopathy in most normotensives, even though all of whom had suffered from HT in childhood in another study (14). Similarly, HT (mean BP of greater than 70 mmHg on three days) was noted in 1.2% of all neonatal admissions to intensive and intermediate care nurseries (21). Indirect ophthalmoscopy was performed in 21 neonates with elevated BP. Eleven of them demonstrated some or all of the following abnormalities, including increased ratio of venous to arterial caliber, vascular tortuosity (including arteriovenous crossing changes), and superficial and deep hemorrhages and exudates, but these findings appeared to resolve after controlling of HT. So HR may develop even in neonates and children in whom atherosclerosis of other causes is unlikely.

As a conclusion, although HR is not a specific sign of HT, the significantly lower prevalence of grade 0 and significantly higher prevalence of grade II HRs in the HT group indicate the effect of HT on retinal vasculature and probable benefits of funduscopy examination in the management of HT due to the limited number of available parameters in this field. Additionally, although the lower incidences and even additional atherosclerotic backgrounds of grade III and IV HRs, their specificity for HT is probably higher, especially for hypertensive crises. Therefore, funduscopy examination should be continued for HT at least until demonstration of some more accurate follow up criteria.

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