An observational study to evaluate the clinical practice of cardiovascular risk management among hypertensive patients in Turkey

Türkiye'de hipertansiyonlu hastalarda kardiyovasküler risk yönetimi uygulamalarını değerlendirmek için gözlemsel çalışma

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ABSTRACT

Objectives: We evaluated clinical practice in cardiovascular risk management and related patient compliance among Turkish hypertensive patients.

Study design: This noninterventional, observational study included 1023 patients (620 women, 403 men; mean age 58.4±10.6 years) with essential hypertension, from 50 centers across Turkey. Patients were evaluated at a cross-sectional phase and a follow-up phase of nine months. Data obtained at the cross-sectional phase included patient demographics, medical and past history, cardiovascular risk status, and current practice patterns regarding cardiovascular risk management.

Results: The mean duration of hypertension was 8.1±7.1 years. The mean body mass index was 30.3±5.2 kg/m^2 and systolic and diastolic blood pressures (BP) were 147.8±22.4 and 88.9±12.5 mmHg, respectively. Ten-year coronary heart disease risk and risk level were significantly higher in males, and significantly increased in the presence of diabetes, metabolic syndrome, and renal disease and/or microalbuminuria (p<0.05). In past year history of cardiovascular risk management, 7.3% of the patients did not have BP measurements; no diet was recommended to 15.6%; 79.3% had high BP levels, and patient compliance with antihypertensive drug treatment and dietary recommendations were 87.7% and 62.5%, respectively. A similar profile was observed for dyslipidemia and diabetes mellitus. The physicians' efforts to motivate the patients to quit smoking, to lose weight, and involve in physical exercise were far below satisfactory levels, and the patients' compliance rates with these recommendations were even lower.

Conclusion: Our study demonstrates that hypertensive patients are not adequately evaluated for cardiovascular risk, which is significantly increased in the presence of various cardiovascular risk factors such as diabetes, metabolic syndrome, and renal disease.

ÖZET

Amaç: Türk hipertansiyon hastalarında kardiyovasküler risk yönetimine yönelik klinik uygulamalar ve ilgili hasta uyumu değerlendirildi.

Çalışma planı: Bu girişimsel olmayan gözlemsel çalışmaya Türkiye'deki 50 merkezden, esansiyel hipertansiyonu olan 1023 hasta (620 kadın, 403 erkek; ort. yaş 58.4±10.6) katıldı. Hastalar kesitsel ve dokuz aylık takip fazları olmak üzere iki fazda değerlendirildi. Çalışmanın kesitsel fazında şu veriler toplandı: Hastaların demografik özellikleri, medikal ve geçmiş öykü, kardiyovasküler risk durumu ve kardiyovasküler risk yönetimine ilişkin güncel klinik uygulamalar.

Bulgular: Hipertansiyonun ortalama süresi 8.1±7.1 yıl bulundu. Beden kütle indeksi ortalaması 30.3±5.2 kg/m^2 idi. Sistolik ve diyastolik kan basınçları sırasıyla 147.8±22.4 ve 88.9±12.5 mmHg idi. On-yıllık koroner kalp hastalığı riski ve risk düzeyi erkeklerde ve eşlik eden diyabet, metabolik sendrom, renal hastalık ve/veya mikroalbüminüri varlığında belirgin olarak daha yüksek bulundu (p<0.05). Geçmiş yıla yönelik kardiyovasküler risk yönetimi değerlendirildiğinde, hastaların %7.3'ünde kan basıncı ölçümü yapılmadığı, %15.6'sında diyet önerilmediği, %79.3'ünde kan basıncının yüksek düzeylerde olduğu, antihpertansif ilaç tedavisi ve diyet önerilerine yönelik hasta uyumunun ise sırasıyla %87.7 ve %62.5 olduğu görüldü. Dislipidemi ve diabetes mellitus için de benzer bir profil vardı. Hekimlerin hastaları sigarayı bırakma, kilo verme ve fiziksel egzersiz yapmaya yöneltme çabaları tatmin edici düzeylerden çok düşük bulunurken, hastaların da bu önerilere uyumları daha da düşük düzeylerdeydi.

Sonuç: Çalışmamız, diyabet, metabolik sendrom ve renal hastalık gibi yüksek risk düzeyleri ile ilişkili kardiyovasküler risk faktörleri olmasına rağmen, hipertansiyon hastalarının kardiyovasküler risk açısından yeterince değerlendirilmediğini ortaya koymaktadır.

Defined as a progressive cardiovascular syndrome arising from complex and interrelated etiologies,[1] hypertension is a potent public health problem and highly prevalent cardiovascular disease risk factor,[2] expanding rapidly in prevalence worldwide.[3,4]

In the prevention of cardiovascular events, an increased emphasis has been placed on hypertension management for global cardiovascular risk reduction, including more sophisticated risk assessment and therapeutic targeting of underlying mechanisms of CVD[5] by the established treatment guidelines.[6-9] Although blood pressure values have been taken as the main variable for determining the need and type of treatment for many years, the most recent guidelines suggest that "All patients should be classified not only in relation to the grades of hypertension, but also in terms of the total cardiovascular risk resulting from the coexistence of different risk factors, organ damage, and disease".[7]

Since the causes of CVD are multifactorial, and hypertension seldom exists as an isolated risk factor,[6] current guidelines use other risk factors in addition to BP levels to determine the global level of risk for CVD.[10] Most of the risk-assessment tools and recommendations included in major guidelines for hypertension management have relied on Framingham datasets and models.[6,11] The most recent guidelines of the European Society of Hypertension and the European Society of Cardiology assess risk in patients with hypertension as low, moderate, high, and very high added risk. These categories correlate with an approximate absolute 10-year CVD risk of <15%, 15% to 20%, >20% to 30%, and >30%, respectively, by the Framingham risk model[12] or with an approximate absolute risk of fatal CVD of <4%, 4% to 5%, >5% to 8%, and >8%, respectively, by the SCORE charts.[13]

In Turkey, Total Cardiovascular Risk Management Initiative was put into practice in collaboration with Ministry of Health, Turkish Society of Cardiology, Turkish Society of Internal Disease Specialty, Turkish Society of Neurology, Turkish Society of Endocrinology and Metabolism, and Turkish Society of Hypertension and Renal Diseases. In this program, risk scoring was based on Joint British Societies' risk scoring model published in 2005 and was modified according to the circumstances of Turkey.[14]

Hypertension management consists of several components, including screening of elevated BP, lifestyle interventions, evaluation for pharmaceutical treatment, continued medical follow-up, and adherence to treatment.[15] The larger the burden of risk —patients with established CVD are among those at the highest risk— the more important it is to reach and maintain BP goals.[9]

Abbreviations:

ACEI	*Angiotensin converting enzyme inhibitor*
ARB	*Angiotensin receptor blocker*
BP	*Blood pressure*
CHD	*Coronary heart disease*
CVD	*Cardiovascular disease*
HDL	*High-density lipoprotein*

Using the broad definition, treating hypertension is treating global cardiovascular risk. For the clinician, however, the goal should be to restore components of cardiovascular risk to optimal levels to restore cardiovascular health.[16] As a matter of fact, data on the details of how physicians manage cardiovascular risk factors in the office or clinic setting are very limited. Although various cardiovascular risk factor guidelines have been promulgated, their dissemination and implementation have not been successful as desired or well studied.[17]

Closure of the gap between effective interventions in research studies and clinicians' practice and the gap between what clinicians recommend to patients and what patients do at home and in their communities have been suggested to be crucial to achieve and maintain BP control. In this regard, implementing health care practices and systems that guarantee continuity of care as well as integrate technology to support clinicians' decision-making and patients' self-management has been indicated to be essential.[18] The present observational study was designed to identify clinical practice in cardiovascular risk management and related patient compliance within a period of 12 months among Turkish hypertensive patients.

PATIENTS AND METHODS

Study design and patients

This noninterventional, cross-sectional observational study was designed to evaluate the clinical practice of physicians working in internal medicine and cardiology clinics regarding cardiovascular risk management among Turkish hypertensive patients during a follow-up phase of nine months.

A total of 1023 patients (620 women, 403 men; mean age 58.4±10.6 years) from 50 centers across Turkey were included in the study. Inclusion criteria were as follows: age ≥18 years, previous diagnosis of essential hypertension, treatment with antihypertensive agents (mono or combined), previous (<3 months)

routine laboratory results for the assessment of target BP levels, and signed informed consent. Known or suspected secondary hypertension, current hospitalization or having been scheduled for hospitalization during the study period, and enrollment in another study were the main exclusion criteria.

Clinical practice and patient compliance regarding cardiovascular risk management were recorded at the time of enrollment. Coronary heart disease risk in 10 years was calculated using the NCEP/ATP III risk scoring algorithm adopted via modification of the risk prediction algorithm from the Framingham Heart Study,[2] incorporating a patient's age, total cholesterol concentration, high-density lipoprotein cholesterol concentration, smoking status, and systolic BP.[19] Taking systolic BP, total cholesterol/HDL cholesterol ratio, smoking status, and age into consideration, four levels of risk to develop CVD in 10 years were defined using risk scoring charts prepared by the Turkish Society of Cardiology based on the Framingham Study: low (<10%), moderate (10-20%), high (>20%), or very high (>30%).[19]

Since the study was planned as an observational and noninterventional real-time registry, the treatment decision was left to the discretion of the physician, including patients whose BP could not be controlled with their current medication.

Data collection

Data on the following characteristics were collected: patient demographics (age, gender), physical measures (height, weight, body mass index, waist circumference), medical history (duration of hypertension, concomitant diseases, risk factors), parameters for calculation of cardiovascular risk (systolic and diastolic BP, serum levels for LDL cholesterol and HDL cholesterol, history and/or laboratory tests related to diabetes mellitus, and smoking status), past history (last 12 months) of practice patterns regarding cardiovascular risk management (physician recommendations and patient compliance related to hypertension, dyslipidemia, diabetes mellitus, smoking and other factors like obesity and exercise), and antihypertensive medications.

Statistical analysis

This study hypothesized that the study population should include a minimum of 1050 patients for the determination of risk management practice in 1-50% of the overall patient population with a 95% confidence interval and 3% error. Statistical analysis was performed using the SPSS package 12.0 for Windows. Data were expressed as mean±standard deviation and/or percentages. Categorical and numerical variables were compared using the chi-square test and Mann-Whitney U-test, respectively. A P value of less than 0.05 was considered statistically significant.

RESULTS

Baseline patient characteristics

Patient demographics, physical and clinical features are given in Table 1. The mean duration of hypertension was 8.1±7.1 years. The mean body mass index was 30.3±5.2 kg/m² and systolic and diastolic BP values were 147.8±22.4 and 88.9±12.5 mmHg, respectively.

Table 1. Patient demographics, physical and clinical features

	Overall (n=1023) (Mean±SD)	Males (n=403, 39.4%) (Mean±SD)	Females (n=620, 60.6%) (Mean±SD)
Age (years)	58.4±10.6	58.2±11.0	58.5±10.4
Body mass index (kg/m²)	30.3±5.2	28.9±4.2	31.3±5.6
Waist circumference (cm)	99.6±13.2	99.7±12.6	99.5±13.6
Hypertension history			
Age at the initial diagnosis (years)	51.1±10.4		
Duration of hypertension (years)	8.1±7.1		
Blood pressure (mmHg)			
Systolic	147.8±22.4	147.1±21.4	148.6±23.1
Diastolic	88.9±12.5	88.1±11.9	89.4±12.8
Lipid levels (mg/dl)			
LDL cholesterol	131.0±39.1	128.6±37.6	132.6±40.0
HDL cholesterol	46.9±12.4	42.7±11.3	49.7±12.3

Table 2. Cardiovascular risk factors

	Available data	Presence of risk factor	
	n	n	%
Metabolic syndrome	989	442	44.7
Family history of cardiovascular disease	988	402	40.7
Diabetes mellitus	1023	318	31.1
Left ventricular hypertrophy	710	220	31.0
Coronary heart disease	974	201	20.6
Obesity	1010	192	19.0
Smoking	1023	169	16.5
Microalbuminuria	718	80	11.1
Renal disorder	968	23	2.4
Peripheral artery disease	968	15	1.6
Concomitant diseases	1023	440	43.0

The most frequent cardiovascular risk factors were metabolic syndrome (44.7%), family history of CVD (40.7%), diabetes mellitus (31.1%), and left ventricular hypertrophy (31.0%) (Table 2). Ten-year CHD risk was 13.4±6.7%, being higher in males than in females (19.2±11.8% *vs*. 13.3±8.1%; $p < 0.001$). Furthermore, the presence of diabetes ($p = 0.009$), metabolic syndrome ($p = 0.005$), and renal disease and/or microalbuminuria ($p = 0.012$) significantly increased 10-year CHD risk (Table 3).

Cardiovascular disease risk level was low in 34.2%, moderate in 40.8%, high in 14.4%, and very high in 10.7% of the patients (Table 4). The presence of diabetes mellitus, metabolic syndrome, and renal disease and/or microalbuminuria shifted the risk to the high and very high risk levels (Table 3).

Antihypertensive and antidiabetic medications were prescribed to 80.8% and 2.4% of the patients, respectively (Table 5). The most frequently used antihypertensive drugs were renin-angiotensin system blockers (ARBs and ACEIs) alone or in combination with diuretics (50.5% of all prescriptions) followed by beta-blockers (22.4%) (Table 5).

Cardiovascular risk management

Considering past year history of cardiovascular risk management, 7.3% of the patients did not have BP measurements; no diet was recommended to 15.6%; and 79.3% had high BP levels indicating a failure in BP control (Table 6). Moreover, patient compliance with antihypertensive drug treatment and dietary rec-

Table 3. 10-year coronary heart disease risk

	Available data	10-year coronary heart disease risk (%)			
	n	Mean±SD	Median	Interquartile range	p^{**}
Overall	1017	13.4±6.7	12	7	
Gender					
Male	403	19.2±11.8	16	11	**<0.001**
Female	614	13.3±8.1	12	5	
Diabetes mellitus					
Present	316	14.2±6.8	13	4	**0.009**
Absent	701	13.0±6.7	12	4	
Metabolic syndrome					
Present	438	13.9±7.0	13	5	**0.005**
Absent	545	12.7±6.3	12	6	
Renal disease / Microalbuminuria					
Present	93	15.4±7.0	13	9	**0.012**
Absent	606	13.4±7.0	12	8	
Combination of 5 risk factors*					
Present	673	13.2±6.6	12	6	0.853
Absent	198	13.3±7.0	12	6.5	

*Five risk factors: Obesity, family history, left ventricular hypertrophy, coronary heart disease, peripheral artery disease; **Mann-Whitney U-test.

Table 4. Cardiovascular disease risk levels of hypertensive patients

| | Available data | Cardiovascular disease risk levels (%) | | | | |
	n	Low	Moderate	High	Very high	p
Overall	1023	34.2	40.8	14.4	10.7	
Diabetes mellitus						
Present	318	10.7	42.5	23.3	24.5	**<0.001**
Absent	705	44.8	40.0	10.8	4.4	
Metabolic syndrome						
Present	442	21.3	38.5	21.3	19.0	**<0.001**
Absent	547	45.9	42.0	8.0	4.0	
Renal disease / Microalbuminuria						
Present	94	22.3	37.2	19.1	21.3	**0.02**
Absent	611	33.6	40.3	14.7	11.5	
Combination of 5 risk factors*						
Present	677	33.2	40.2	14.5	12.1	**<0.05**
Absent	198	36.4	40.9	13.6	9.1	

*Five risk factors: Obesity, family history, left ventricular hypertrophy, coronary heart disease, peripheral artery disease.

ommendations were not as high as it should be (87.7% and 62.5%, respectively).

A similar profile was observed for dyslipidemia and diabetes mellitus: blood levels of lipids and glucose were not measured in 18.6% and 22.4% of the patients, respectively, though lipid levels were high in 56.9% and blood glucose levels were high in 35% (Table 6). Compliance with drug treatment was better in both dyslipidemic and diabetic patients (82.4 for lipid lowering drugs, 92.1% for oral antidiabetics and 73.9% for insulin), but lower for dietary recommendations (63.8 and 66.4%, respectively; Table 6).

Of 126 patients whose data were available, it was seen that the physician made effort to motivate the patient to quit smoking in only 43.7%, and patient compliance with this recommendation was very low (18.9%) (Table 6). Weight and waist circumference measurements were performed in less than half of the patients (42.2%), though 55% were diagnosed to be overweight (Table 6). The physicians' effort to motivate the patient to lose weight and patients' compliance were also less than 50% (Table 6). The profile was worse regarding physical exercise; only 28.5% of the patients declared to exercise regularly. Physicians' effort to motivate the patient to exercise was limited to 46.9%, and 39.8% of the patients followed this recommendation (Table 6).

Table 5. Antihypertensive and antidiabetic treatment prescribed to the study patients (n=1023)

	n	%
Antihypertensive treatment	827	80.8
Beta-blocker	294	35.6
Angiotensin receptor blocker+diuretic	282	34.1
Calcium channel blocker	261	31.6
Angiotensin converting enzyme inhibitor	149	18.0
Angiotensin receptor blocker	128	15.5
Angiotensin converting enzyme inhibitor+diuretic	105	12.7
Diuretic	50	6.1
Aldosterone antagonist	23	2.8
Alpha-blocker	22	2.7
Total	1314*	
Antidiabetic treatment	25	2.4
Oral antidiabetic	19	76.0
Insulin	4	16.0
Insulin+oral antidiabetic	2	8.0

*There were patients on more than one drug.

DISCUSSION

This observational study was planned to provide an insight into the current trends for cardiovascular risk management in hypertensive patients. The prevalence of hypertension was previously reported to be 30% in 1990's by the TEKHARF study[20] and 31.8% in 2003 by The PatenT study[21] in Turkey.

Table 6. Past year history of cardiovascular risk management in the study patients

Management interventions and patients' compliance	Available data	Managed patients	
	n	n	%
Management of hypertension			
Blood pressure was measured within the past 12 months	1023	948	92.7
Blood pressure measurement showed high levels	948	752	79.3
Medication(s) was(were) prescribed for hypertension	858	667	77.7
Medication(s) was(were) used as recommended	577	506	87.7
A diet was recommended for hypertension	856	722	84.4
Good patient compliance with dietary recommendations	645	403	62.5
Management of dyslipidemia			
Lipid levels were measured within the past 12 months	1022	832	81.4
Lipid level measurements showed high levels	824	469	56.9
Medication(s) was(were) prescribed for dyslipidemia	671	367	54.7
Medication(s) was(were) used as recommended	324	271	82.4
A diet was recommended for dyslipidemia	659	502	76.2
Good patient compliance with dietary recommendations	447	285	63.8
Management of diabetes mellitus			
Blood glucose levels were measured within the past 12 months	1021	792	77.6
Blood glucose level measurements showed high levels	792	277	35.0
Medication(s) was(were) prescribed for diabetes	547	236	43.1
An oral antidiabetic was prescribed for diabetes	236	210	89.0
Medication(s) was(were) used as recommended	202	186	92.1
Insulin treatment was prescribed	236	46	19.5
Insulin was used as recommended	46	34	73.9
A diet was recommended for diabetes	526	303	57.6
Good patient compliance with dietary recommendations	268	178	66.4
Management of smoking			
The physician made an effort to motivate the patient to quit smoking (drug treatment, acupuncture, etc.)	126	55	43.7
The patient showed compliance with the physician's recommendation	53	10	18.9
Management of physical measures and exercise			
Weight and waist circumference were measured within the past 12 months	988	417	42.2
Diagnosed to be overweight before	755	415	55.0
The physician made an effort to motivate the patient to lose weight (drug treatment, acupuncture, etc.)	620	275	44.4
Good patient compliance with the physician's recommendation to lose weight	245	118	48.2
Regular exercising	1000	285	28.5
The physician made an effort to motivate the patient to exercise	842	395	46.9
Good patient compliance with the physician's recommendation to exercise	359	143	39.8

The PatenT study indicated that 32.2% of hypertensive patients never had their BP measured, only 40.7% were aware of their diagnosis, 31.1% were receiving pharmacologic treatment, and only 8.1% had their BP under control.[21] Therefore, it seems reasonable to expect a high cardiovascular risk in relation to poor management of hypertension, and the primary objective of the present study was to identify clinical

practice in cardiovascular risk management among hypertensive patients. Indeed, when the patients were classified according to the CVD risk scoring charts, the majority of patients were found to be under moderate, high, or very high cardiovascular risk (40.8%, 14.4%, and 10.7%, respectively).

In line with the well-documented finding that hypertension is not a mere function of a discrete BP level, but should be considered as part of a complex syndrome of pathologic changes in the vasculature and target organs,[5] metabolic syndrome, family history, diabetes mellitus, left ventricular hypertrophy, CHD, obesity, smoking, microalbuminuria, renal disease, and peripheral artery disease were the established risk factors encountered in decreasing order in our patients having essential hypertension for less than 10 years. Accordingly, 43% of the study patients had at least one of these concomitant risk factors.

Owing to higher CVD risk levels in the presence of diabetes or metabolic syndrome or renal disease/microalbuminuria, calculation of 10-year CHD risk via the NCEP/ATP III risk scoring algorithm seems to yield a more accurate estimation of cardiovascular risk since it includes scoring of risk factors considered to be CHD risk equivalents such as diabetes mellitus, which was neglected in the Framingham risk scoring algorithm. Since patients with CHD or a CHD risk equivalent are considered to be at very high risk for developing an acute cardiovascular event,[22] the likelihood of identifying a diabetic patient to be in low CVD risk category seems to be minimized by means of 10-year CHD risk estimation. In our study population, male gender, diabetes mellitus, metabolic syndrome, and renal disease and/or microalbuminuria were significantly associated with higher scores in 10-year CHD risk estimation. Novel analytical techniques have been developed to provide more accurate risk estimates in the future.[22,23]

Despite major advances in pharmacological treatment, hypertension is an increasingly common health problem worldwide.[4] Blood pressure control in patients on antihypertensive medication has been evaluated as unsatisfactory in the United States, Canada, and other European countries,[24] with only approximately one-third of hypertensive patients achieving recommended BP goals.[5] Accordingly, the finding that 79.3% of the patients had high BP values in both genders indicates insufficient BP control in our study population.

Not only poor adherence of the physicians to the guidelines, but also poor patient compliance contrib-

utes to this failure. Patient compliance has been reported to be the leading cause of poor BP control.[25] There are reports indicating that less than one-third of the patients still take their antihypertensive drugs after one year on antihypertensive treatment, while 40%-50% change or discontinue their treatment within six months.[26] Moreover, adherence to the use of antihypertensive medications has been reported to be critical in avoiding hypertension-related morbidity, mortality, and in decreasing economic costs to patients such as the cost of additional prescriptions, emergency department visits, hospitalizations, physician office visits, and productivity losses.[27] Good treatment adherence has several benefits for both the patient and the health care system, as it is associated with improved BP control, reduced risk for adverse cardiovascular events, and reduced all-cause and hypertension-related costs.[28]

All current guidelines acknowledge that ≥1 antihypertensive agent is required in most patients with hypertension to reach desired BP goals, especially <130/80 mmHg, which the newer guidelines encourage as part of an effective strategy to reduce cardiovascular risk.[29] The recent updates of the European Society of Hypertension and European Society of Cardiology guidelines acknowledge poor hypertension control rates and endorse the use of combination therapy to improve BP control[7] and a recent analysis supports the use of ACEIs, ARBs, calcium channel blockers, or thiazide-type diuretics as first-line therapy, supplemented by other antihypertensive drugs if necessary.[10] A total of 1314 drugs were used by 827 patients in the present study. In accordance with the above suggestions, the most frequently used antihypertensive drugs were ARBs and ACEIs alone or in combination with diuretics (50.5% of all prescriptions) followed by beta-blockers (22.4%).

In our study, 87.7% of the patients declared that they were using their medication properly. Tolerability profile of ARBs is likely to be higher than with combinations involving other agents, making ARBs ideal candidates for combination therapy.[28] Higher prescription rates for ARBs alone (9.7%) or in combination with diuretics (21.5%) might have a prominent role in relatively high compliance with antihypertensive medications in our population.

However, compliance rates for dietary recommendations aiming cardiovascular risk management for hypertension, dyslipidemia, and diabetes mellitus were lower, emphasizing that BP control would not reach desirable levels if patients gain weight, perform

little physical activity, smoke, and take excessive alcohol even though progressively increasing doses of multiple medications are used.[30]

As defined in the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)[8] and the guidelines of the World Health Organization-International Society of Hypertension,[9] major lifestyle modifications are often critically important in appropriate control of underlying hypertension.[30]

The role of the physician who would determine what to prescribe and would not ignore the need to convince the patient to stay on treatment is critical in improving patient adherence and persistence.[31]

The findings of the present study indicate that most healthcare providers initially do impart advice for lifestyle changes, but do not follow the outcomes, resulting in lower patient compliance rates for both drug treatment and nondrug modifications.

In a previous study concerning recommendations and compliance with the DASH (Dietary Approaches to Stop Hypertension) diet in hypertensive patients, it was found that only one-fifth of the respondents were advised to go on a diet or change their eating habits and, of those, only two-thirds followed that advice.[32] In our study, dietary recommendation for losing weight was made in 44.4%, exercise was recommended in 46.9%, and the corresponding compliance rates were 48.2% and 39.8%. Indeed, there is considerable evidence for the protective effects of both physical activity and cardiorespiratory fitness on hypertension, suggesting an inverse dose-response relationship between increasing levels of physical activity and all-cause and CVD mortality.[33]

Physicians have a particular opportunity to discuss changes in behaviors of their patients who have already been diagnosed with hypertension or pre-hypertension or who may be at risk for developing hypertension, and may play a significant role in the success of lifestyle changes.[34] Accordingly, physicians' advice was found to motivate patients and increase their confidence in making lifestyle changes and was shown to be a predictor of attempts to change lifestyle behaviors.[32] However, lack of time, patient noncompliance, inadequate teaching materials, lack of training in counseling, lack of knowledge, inadequate reimbursement, and low physician confidence were reported as barriers to success.[35] Additionally, many healthcare providers may not consider the time spent for counseling patients on lifestyle changes very cost-effective

because of the misconception that many patients do not follow physicians' advice. This may give rise to a predilection for other interventions such as treating comorbidities and medication counseling rather than life style modifications.[32]

A study comparing physicians' practices on cardiovascular disease risk factor management in France and the United States found that French primary care physicians focused more on lifestyle modifications than medication management compared with US counterparts (53% *vs*. 33%).[17] French physicians were reported to spend more time with their patients, rely more regularly on electronic health records, use evidence-based guidelines, and have more ''fun'' in the practice of medicine.[36]

In this regard, besides an educational intervention for health care providers aiming to improve their knowledge, communication skills, and confidence for delivering advice, and thus to increase the delivery of timely and appropriate educational materials to patients,[32] the more direct incorporation of the guidelines into daily practice may be a relatively simple step in an attempt to enhance cardiovascular risk reduction.[37]

In addition to physician-related factors, the asymptomatic and chronic nature of hypertension adversely affects both adherence and persistence of the patients due to the "lack" of symptoms which would otherwise remind them of their condition and the "absence" of adverse effects when medications are not taken properly. In addition, the patient's understanding of hypertension and perception of the condition may also affect adherence. If a patient is not aware of the chronic nature of the disease, or believes that it is a trivial condition, he/she would be less likely to adhere to and persist with the prescribed therapy.[28]

Harmonization and communication between specialist physicians such as cardiologists and neurologists and primary care physicians who are involved in day-to-day care of patients will improve hypertension treatment in patients with a prior event. Attaining and maintaining BP goals in these patients will be an important factor in prolonging their survival and preventing premature disability.[2]

To accomplish this mission, clinicians must treat hypertension in its broadest sense, in that those with the hypertension specialist designation, whether they are specialists in internal medicine, family medicine, cardiology, nephrology, endocrinology, obstetrics and gynecology, or others, must be able to deal not only

with BP elevations, but also with dyslipidemia, metabolic disturbances (e.g., type 2 diabetes mellitus), and metabolic syndrome.[16]

Since CVD has been and remains the leading cause of death in essentially all first-world nations for more than five decades, anyone who successfully operates a ''better mousetrap'' to address this burden should rightfully be the object of scientific admiration.[37]

In conclusion, the results of this observational, noninterventional study demonstrate that hypertensive patients are not fully evaluated for cardiovascular risk, which is significantly increased in the presence of various concomitant cardiovascular risk factors such as diabetes, metabolic syndrome, and renal disease. Another striking finding on the part of hypertensive patients is that there is a considerable gap between physicians' recommendations of appropriate management and the levels of patients' compliance with both drug treatment and lifestyle modifications.

Acknowledgements

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