

# Controlling hypertension in Turkey: not a hopeless dream

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Despite major progress in prevention, diagnosis, and treatment during the recent decades, hypertension remains the leading risk factor for cardiovascular disease and mortality throughout the world. The prevalence of hypertension in developing countries continues to rise reaching alarming rates. Several risk factors of hypertension appear to be more common in developing countries than in developed countries. In Turkey, hypertension is a prevalent condition affecting approximately 22.5 million individuals. Hypertension control (defined as blood pressure < 140/90 mm Hg) rate increased from 8.1% in 2003 (first Prevalence, awareness, treatment, and control of hypertension in Turkey (Patent) study) to 28.7% in 2012 (Patent 2 study). Meanwhile, rates of cardiovascular morbidity and mortality remained high in Turkey. Controlling risk factors such as hypertension, tobacco use, unhealthy diet, obesity, diabetes, hyperlipidemia, and physical inactivity can prevent most of the deaths from cardiovascular disease. It is also crucial for the public health system to have a hypertension education program aimed at reducing cardiovascular disease and prevention and control of hypertension promoting a healthy lifestyle in Turkey. Such a program could positively affect other lifestyle-related diseases as well. Importantly, cooperation among the components of the health system could contribute to improved outcomes in hypertensive populations.

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According to the 2010 report of the World Health Organization on noncommunicable diseases, cardiovascular diseases are the most common cause of death, and every year more people die from cardiovascular diseases than from any other cause worldwide, both in developed countries and in developing countries.<sup>1</sup> Worldwide, annually more than nine million deaths, or 16.5% of all deaths can be attributed to directly or indirectly to the effects of hypertension.<sup>2</sup> While over 80% of cardiovascular deaths occur in low- and middle-income countries,<sup>1</sup> hypertension has become a major public health issue in many developing countries following an epidemiological transition from communicable to noncommunicable chronic diseases during the past three decades.<sup>3,4</sup> Thus, it is important to understand the relation between hypertension and cardiovascular disease in developing countries in the twenty-first century. According to the results of the Turkey Burden of Disease Study<sup>5</sup> and the data from Turkish Statistics Institute, cardiovascular diseases are among the highest causes of death in Turkey.<sup>6</sup> We briefly summarize the magnitude of high blood pressure problem in Turkey by providing data related to hypertension prevalence, awareness, and treatment and control rates from our national surveys. We will also discuss some of the known risk factors for hypertension, particularly demographics and lifestyle factors in Turkey. Finally, we will outline the barriers against hypertension control and propose ways to achieve better control rates in Turkey.

## RISK FACTORS AND PREVALENCE OF HYPERTENSION

Despite having a relatively young population (50% of population is under the age of 30 years), the prevalence of cardiovascular disease has been reported unexpectedly high in Turkey. Before 1995, the prevalence of cardiovascular risk factors in Turkey was not well known. Distribution of the risk factors in our population was studied in several large population-based surveys such as the Turkish Heart Study (THS),<sup>7</sup> the Turkish Adult Risk Factor Survey<sup>8,9</sup> (TEKHARF study), the Turkish Diabetes Epidemiology Study<sup>10</sup> (TURDEP), the Prevalence, awareness, treatment, and control

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of hypertension in Turkey (PatenT) study,<sup>11</sup> the treatment and control of hypertension in the Turkish population (TURKSAHA) study,<sup>12</sup> and the prevalence of metabolic syndrome among Turkish adults (METSAR) study (Table 1).<sup>13</sup> In another population-based survey named the Chronic Renal Disease in Turkey (CREDIT) study ( $n=10,748$ ), the prevalence of chronic kidney disease (15.7%) in Turkey and other cardiovascular risk factors were evaluated. In CREDIT, the prevalence of hypertension,

diabetes mellitus, dyslipidemia, obesity, and metabolic syndrome were reported as 32.7%, 12.7%, 76.3%, 20.1% and 31.3%, respectively (Table 1).<sup>14</sup> In a recent repeated population-based survey called TURDEP-II study, after 12 years from the first one, the prevalence of diabetes mellitus, obesity, and hypertension was found as 16.5%, 36%, and 31.4%, respectively (Table 1).<sup>15</sup> The emergence of hypertension and other risk factors for cardiovascular diseases as a major health problem in Turkey may be related to increased

**Table 1 | Selected publications on cardiovascular risk factors in Turkey**

Study	Year of publication	n	Study population	Key findings
The Turkish Heart Study <sup>7</sup>	1995	9000	Nation-wide sample of general population	<ul style="list-style-type: none"> <li>● High smoking rates: 50–70% in men and 30–40% in women</li> <li>● Lower HDL levels</li> <li>● High triglyceride levels</li> <li>● Prevalence of hypertension: 17% in men and 26% in women</li> <li>● Mean BMI: 25.8 kg/m<sup>2</sup></li> <li>● Different apolipoprotein E phenotyping from United States and European population</li> </ul>
The Turkish Adult Risk Factor Survey (TEKHARF study) <sup>8</sup>	2001	3687	10-Year follow-up Representative of adult general population (age ≥20 years)	<ul style="list-style-type: none"> <li>● CV mortality rate: coronary deaths (42%) and cerebrovascular deaths (11%)</li> </ul>
Review of the results of four national surveys between 1990 and 2000 <sup>9</sup>	2001		Representative of adult general population (age ≥20 years)	<ul style="list-style-type: none"> <li>● Independent predictors of future coronary events and deaths: systolic blood pressure, total/HDL-cholesterol ratio, diabetes mellitus, and central obesity</li> <li>● Deteriorating lipid profile entering adulthood</li> <li>● The prevalence of hypertension: 36% in men and 49% in women over 30 years</li> <li>● The prevalence of obesity: 14% in men and 30% in women</li> <li>● The prevalence of diabetes mellitus was 11%</li> <li>● BMI was a predictor of blood pressures</li> <li>● High but decreasing rate prevalence of smoking</li> <li>● Increasing prevalence of diabetes</li> <li>● Physical activity was inversely associated with blood pressure and blood glucose</li> </ul>
TURDEP study <sup>10</sup>	2002	24,788	General population (age ≥20 years) (randomly sampled)	<ul style="list-style-type: none"> <li>● The prevalence of diabetes was 7.2% (previously undiagnosed, 2.3%) and of impaired glucose tolerance, 6.7%</li> <li>● Age, BMI, WHR, familial diabetes, and hypertension were independently associated with diabetes mellitus</li> <li>● The prevalence of hypertension and obesity were 29% and 22%, respectively</li> </ul>
PatenT study <sup>11</sup>	2005	4910	Representative of adult general population (age ≥18 years)	<ul style="list-style-type: none"> <li>● The prevalence of hypertension was 31.8% (27.5% in men and 36.1% in women)</li> <li>● Mean BMI was 26.8 kg/m<sup>2</sup></li> <li>● In subjects with hypertension: <ul style="list-style-type: none"> <li>● Mean BMI was 29.6 kg/m<sup>2</sup></li> <li>● The prevalence of diabetes mellitus was 8.5%</li> <li>● The prevalence of hyperlipidemia was 42.3%</li> </ul> </li> <li>● Independent predictors for uncontrolled blood pressure were increasing age (≥65 years), the presence of diabetes mellitus, high BMI (≥25 kg/m<sup>2</sup>), and the presence of CV disease</li> </ul>
TURKSAHA study <sup>12</sup>	2006	16,270	Nation-wide sample of hypertensive patients consulted in primary care units	
METSAR study <sup>13</sup>	2007	4259	Nationwide sample of general population	<ul style="list-style-type: none"> <li>● Metabolic syndrome diagnosed using the Adult Treatment Panel III criteria was 33.9% and differed significantly in men (28%) and women (39.6%)</li> </ul>
CREDIT study <sup>14</sup>	2011	10,748	Representative of adult general population (age ≥18 years)	<ul style="list-style-type: none"> <li>● The prevalence of hypertension, diabetes mellitus, dyslipidemia, obesity, and metabolic syndrome were reported as 32.7%, 12.7%, 76.3%, 20.1%, and 31.3%, respectively</li> </ul>
TURDEP-II study <sup>15</sup>	2013	26,499	General population (age ≥20 years) (randomly sampled)	<ul style="list-style-type: none"> <li>● The prevalence of diabetes mellitus, obesity, and hypertension was reported as 16.5%, 36%, and 31.4 %, respectively. Compared with TURDEP-I,<sup>10</sup> the rate of increase for diabetes: 90%; IGT: 106%; obesity: 40%; and central obesity: 35%, but hypertension decreased by 11% during the past 12 years</li> </ul>

Abbreviations: BMI, body mass index; CREDIT, The Chronic Renal Disease in Turkey study; CV, cardiovascular; HDL, high-density lipoprotein; METSAR, the prevalence of metabolic syndrome among Turkish adults study; PatenT, the Prevalence, awareness, treatment, and control of hypertension in Turkey study; TURDEP, the Turkish Diabetes Epidemiology Study; TURKSAHA, the treatment and control of hypertension in the Turkish population study; WHR, waist-to-hip ratio.

life expectancy of the population, urbanization, smoking, and socioeconomic changes causing sedentary habits, obesity, high salt consumption, unhealthy dietary behaviors, and alcohol consumption, among others.

In 2003, the Turkish Society of Hypertension and Renal Diseases carried out a population-based cross-sectional epidemiological survey, determining the distribution of blood pressure and the PatenT study, from 26 cities in seven geographical regions of Turkey, with proportional representation of rural and urban populations.<sup>11</sup> This national survey was repeated in 2012 (PatenT 2 study, unpublished). In both surveys, hypertension was defined as blood pressure  $\geq 140/90$  mm Hg, or previously diagnosed and/or taking antihypertensive medications. In 2003, the overall age- and sex-adjusted prevalence of hypertension was 31.8% and it was higher in women than in men (36.1% vs. 27.5%,  $P < 0.001$ ). There was no difference in the prevalence among rural and urban inhabitants. The prevalence of hypertension may have reached a plateau, when PatenT data for 2003 were compared with that for 2012 (30.3% based on unpublished preliminary analysis).

#### AWARENESS, TREATMENT, AND CONTROL OF HYPERTENSION

Although the prevalence of hypertension in PatenT ( $n = 4910$ , 2003) and PatenT 2 ( $n = 5437$ , 2012) surveys were fairly stable at approximately 30%, from a statistical perspective hypertension awareness, treatment, and control rates have improved in Turkey (Table 2). Overall, 54.7% of hypertensive patients were aware of their diagnosis in 2012 compared with 40.7% in 2003. Hypertension treatment rate increased from 31.1% in 2003 to 47.4% in 2012, and control rate in hypertensives increased from 8.1% in 2003 to 28.7 in 2012. The rate of hypertension control in treated patients improved significantly between 2003 (20.7%) and 2012 (53.9%). Factors associated with better control of hypertension were advanced age, female sex, and higher education level (unpublished data).

Despite the improvement in awareness, treatment, and control of hypertension in the past 10 years, only half of all hypertensive patients were aware of their condition and about one-third of hypertensives had their blood pressure under control. More worrying is the non-measurement rate in the adult Turkish population. Although in the whole group 32.2% had never had their blood pressure measured in 2003,

non-measurement rate was 21.9% among PatenT 2 subjects. Another striking finding of PatenT 2 survey was that 15.5% of individuals had never had their blood pressure measured even when they had been admitted to a health-care facility in Turkey.

The low awareness rate of hypertension is the most important difference between developed and developing countries. The public health response to this challenge should drive efforts to promote awareness, and launch studies of risk factors for hypertension, and understanding of the impact of lifestyle changes.

Hypertension is the so-called silent killer, usually with no obvious symptoms. The sole way to diagnose hypertension is through the measurement of blood pressure. More than 100 years after the invention of the sphygmomanometer, measurements of blood pressure are still variable, largely because guidelines for blood pressure measurement are not often followed in the rushed assessment of patients in busy clinics.

Home blood pressure monitoring (HBPM) can be a self-management tool that engages patients in their treatment program and is more commonly utilized now than 10 years ago. However, the prevalence of ownership of a home sphygmomanometer and the awareness and compliance of the patients with HBPM guidelines are less known, especially in developing and underdeveloped countries. Therefore, we conducted a telephone survey<sup>16</sup> to estimate the prevalence of ownership of a home sphygmomanometer among hypertensive subjects, to investigate factors affecting ownership of a sphygmomanometer, and to compare how HBPM was used in daily practice with respect to the current guidelines.<sup>17,18</sup> Among 2747 hypertensive patients enrolled in the study, 1281 (46.6%) had a home sphygmomanometer and 60% of the patients were using wrist devices. Factors associated with ownership of a sphygmomanometer were female gender, older age, obesity, higher educational status, higher income level, living in urban areas, and awareness of hypertension and antihypertensive drug usage. Only 16% of the devices were used on the advice of a physician. These findings highlight the need for efforts to improve the reliability of HBPM in Turkey. Accordingly, the Turkish Society of Hypertension and Renal Diseases launched an action plan. The action plan included: (1) establishment of a working group for blood pressure measurement; (2) creating a video

**Table 2 | Trends in prevalence, awareness, treatment, and control of hypertension in adults in Turkey**

	PatenT study (2003), N=4910			PatenT 2 study (2012), N=5437			P PatenT versus PatenT 2
	Female, n=2891	Male, n=2019	Total, n=4910	Female, n=2733	Male, n=2704	Total, n=5437	
Prevalence (n, %)	1151 (36.1)	653 (27.5)	1804 (31.8) <sup>a</sup>	882 (32.3)	768 (28.4)	1650 (30.3)	0.123
Awareness (n, %)	552 (48.0)	182 (27.9)	734 (40.7)	590 (66.9)	312 (40.6)	902 (54.7)	<0.001
Treatment (n, %)	426 (37.0)	135 (20.7)	561 (31.1)	523 (59.6)	256 (33.5)	779 (47.4)	<0.001
Control (n, %)	94 (8.2)	52 (8.0)	146 (8.1)	329 (37.3)	145 (18.9)	474 (28.7)	<0.001
Treated and controlled (n, %)	74 (17.4)	42 (31.1)	116 (20.7)	294 (56.2)	126 (49.2)	420 (53.9)	<0.001

Abbreviation: PatenT, Prevalence, awareness, treatment, and control of hypertension in Turkey.

<sup>a</sup>Age and sex adjusted.

film about blood pressure measurement and HBPM in the native language; (3) preparation of educational materials such as brochures, booklets, standard logbooks, and a checklist form; (4) encouragement of the patients to carry their devices to their physicians for interpretation of readings in the memory; (5) publishing all educational material including the video film on the official website (all freely downloadable); (6) listing of all validated devices available in Turkey on the website; (7) giving permission to the retailers of validated devices (all devices available in Turkey are imported) for using the prepared educational materials and support their distribution; and finally (8) collaboration with other medical societies to increase public awareness regarding the reliability of HBPM. The efficacy of this action plan and requirement for possible additional measures remain to be seen. HPBM based on correct blood pressure measurement should be encouraged by national programs aimed to control hypertension.

Hypertensive patients are advised to lower their blood pressure below 140/90 mm Hg through sustained lifestyle modification and/or pharmacotherapy. Adopting a healthy lifestyle including losing weight, maintaining a healthy diet with low sodium, regular moderate physical activity, and limiting alcohol intake is critical for the prevention and management of hypertension.<sup>19,20</sup> Furthermore, lifestyle interventions are helpful in controlling cardiovascular risk factors other than hypertension, such as high cholesterol level, diabetes, or smoking. Therefore, it is important to improve our understanding of people who are less likely to adhere to recommended lifestyle habits for blood pressure prevention and control in national surveys. The most common barriers against adherence to healthy lifestyle habits were reported as decreased motivation to dietary changes, weight control, smoking, and alcohol intake, and time restriction or concomitant health conditions interfering with physical activity.<sup>21</sup> National programs or interventions to improve lifelong adherence to lifestyle changes could be enhanced by considering these factors in their design.

#### AN IMPORTANT ROLE FOR THE HEALTH-CARE SYSTEM

The World Health Organization European Health for all Database (HFA-DB) lists Turkey in the bottom third group of countries spending less than US\$700 per capita PPP (purchasing power parity).<sup>22</sup> There is a need for increased government investment in prevention, early detection, treatment, and control of hypertension and other risk factors through national programs aimed at reducing the burden of cardiovascular mortality and morbidity. Governments also need to dedicate adequate funding for educating the people and health professionals.

The implementation of the 'Health Transformation Program' by the Ministry of Health in 2003 had significant effects on the primary and secondary levels of health care in Turkey.<sup>23</sup> Since 2011, with the introduction of a family practitioner scheme nationwide, recent regulations on public health system have put special emphasis on the

reorganization and strengthening of primary care services for noncommunicable diseases.

The national surveys are vital to assess the burden of hypertension and associated risk factors as a prerequisite for effective prevention and control strategies in Turkey. Monitoring the data on hypertension and chronic diseases in populations is an essential step in making health policies and setting research and program priorities. The information acquired from the population-based studies mentioned above helped us understand the reasons for the high prevalence of cardiovascular disease in Turkey, and with the collaboration of the Ministry of Health and the Turkish Society of Cardiology, first National Heart Health Policy Document was developed in 2006. Hypertension, smoking, and obesity were determined as targets. Major public health campaigns were organized to tackle these risk factors. Two years later, smoking was banned in all enclosed areas by a law enacted by the Turkish Government in 2008. The Ministry of Health, in 2009, launched the Turkish Diabetes Prevention and Control Program with the collaboration of many national societies, governmental/non-governmental organizations, academia, and health-care providers. Later the National Action Plan for Diabetes for 2011–2014 was published aimed at increasing awareness of diabetes and its risk factors, promoting public adoption of healthy lifestyle, and treatment and controlling of diabetes. The first workshop was organized by the Ministry of Health to establish another national prevention program in kidney diseases in 2013 (<http://www.saglik.gov.tr>).

Another important public health problem is high salt consumption in Turkey. The Salt Intake in Turkish Population (SALTURK) study demonstrated that daily urinary sodium excretion was  $308.3 \pm 143.1$  mEq per day (18.01 g per day salt intake) in a nationally representative sample of the adult Turkish population.<sup>24</sup> Campaigns in sodium restriction along with efforts to increase public awareness about the adverse health effect of salt consumption would be extremely important in preventing and controlling hypertension. Regulations for the food industry to reduce salt intake in populations should be enforced as well. As an initial effort, the Turkish Ministry of Food, Agriculture, and Livestock has taken a significant step towards setting out a timetable for reducing salt content of bread by a regulation issued in July 2013.

#### FUTURE DIRECTIONS

The World Health Organization has proposed strategies for the prevention and control of noncommunicable diseases including risk factor surveillance, a multisector policy aimed at creating an environment promoting healthy habits, plans targeting both the general population and selected high-risk groups, and integrated cost-effective case management at primary health-care level.<sup>25</sup> In terms of hypertension along with the other cardiovascular risk factors, emphasis should first be given to awareness campaigns targeting the general population.

Although some progress has been made in recognizing and addressing hypertension as a major public health issue,



more needs to be done. There is a need for a national prevention and control program for hypertension in Turkey. Efforts to tackle the hypertension problem should be comprehensive including all sectors of the community. Special attention should be given to groups most at risk, that is, those least aware or treated. A national program that includes interventions to improve the knowledge, attitude, and behaviors of all parts of the community including patients and health professionals in the perspective of prevention, early diagnosis, adherence to treatment, and control of hypertension would be particularly helpful. This program should be targeting the general population and relying on extensive health education through the mass media, incorporating a healthy lifestyle education program in the elementary school curriculum as a preventive strategy. Program should also target the hypertensive individuals by screening activities, whereby hypertensive patients should be offered interactive teaching sessions on a comprehensive management plan.

The prevalence of hypertension has reached a plateau, and during the past decade awareness, treatment, and control rates of hypertension seem to be partially improved. Several factors may have played a role in these results. First, the accessibility to the health-care system and to drugs has improved since the implementation of Health Transformation Program, and the rates of awareness and treatment of hypertension have also increased. Second, both local and national educational activities and campaigns performed by the national societies such as our society, Turkish Society of Nephrology, Turkish Society of Cardiology, and Turkish Society of Internal Medicine and Family Medicine Societies may have an impact on education of doctors, nurses, and other health professionals. Third, primary care services may have also improved after the introduction of the family practitioner-led efforts for the diagnosis of hypertension.

In summary, the most important steps to increase hypertension control in Turkey are:

- To detect hypertension and its risk factors in the general population,
- To use primary health care as the key point of risk assessment, diagnosis, treatment, and follow-up,
- To develop simple algorithms for screening, evaluation, diagnosis, and follow-up,
- To organize community programs aimed at increasing self-referral for risk assessment and diagnosis,
- To promote healthy lifestyle measures in general population,
- To allocate adequate human resources (doctors, nurses, and other health professionals) for diagnosis and follow-up,
- To adopt a simple global cardiovascular risk approach as a strategy for medical treatment,
- To educate community and health professionals about blood pressure and cardiovascular disease,
- To improve electronic health record systems and health information system, and
- To set up targets for monitoring the effect of intervention programs.

## DISCLOSURE

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