Karşıyaka Prevalance and Awareness of Hypertension Study (KARHIP)

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Abstract

Background: The study was planned to assess potential differences in hypertension prevalance and hypertension related demographic properties in an urban area with relatively higher income and cultural population compared to the national average.

Methods: Fieldwork was done by educated and dedicated personnel at Karsiyaka Municipality Building by one by one interviewing poll, blood pressure measurement, rhythm and body composition analysis in February 2014. Hypertension was defined as an average systolic blood pressure ≥140 mmHg or an average diastolic blood pressure ≥90 mmHg.

Results: Out of a total of 1417 (627 males and 790 females) people enrolled, 780 people were hypertensive (prevalence 55%). Hypertension prevalence in the middle age group (age 35-65) was 46% and in the geriatric age group (age>65) it was %79. 216 out of 780 hypertensive (27.7%) people were not aware of their disease. The proportion of people taking antihypertensive treatment was 69.4% and the proportion under control was 34.7%, whereas the control rate was 50.1% in 541 patients who were aware of their diseases.

Conclusions: Hypertension prevalances in our study were similar to the PatenT 2 trial prevalances, which were 46 % for the middle age group and 78% for the geriatric age group. Compared to PatenT 2 data, the rate of hypertension awareness (54.7% vs 72.3%) and the rate of being under treatment (47.5% vs 69.4%) were higher. The rate of controlled hypertension was a little bit higher (28.7 % vs 34.7%) in our group, whereas control rates in aware and treated groups were similar (53.9 % and 50.1 %) in both studies.

Keywords: Hypertension, Prevalance, Awareness, Treatment

Introduction

Hypertension is the most important current health problem and one of the leading causes of morbidity and mortality. 26.4 % of the adult population is hypertensive since year 2000 and this ratio is expected to increase to 29.2 % by the year 2025 [1]. It is estimated that 1.5 billion people all over the world are hypertensive and 9.4 million die every year due to hypertension [2]. Cardiovascular diseases are responsible for 50 % of all deaths and hypertension is directly responsible for 25% of all deaths in Turkey [3]. Therefore hypertension accounts for an important proportion of healthcare expenditure.

Regional and national studies investigating hypertension prevalence in Turkey have been conducted since the 1960s. Turkish Hypertension Prevalence Studies have been conducted by Turkish Hypertension and Renal Diseases Association to assess current prevalence, distrubution, awareness, treatment and control rates comprehensively in our country. Demographic data, life style properties and accompanying risc factors are also investigated in this nationwide studies [4,5].

The Karşıyaka Hypertension Prevalence and Awareness Study (KARHIP) was planned to assess potential differences in hypertension prevalence and hypertension related demographic

properties in a relatively higher income and cultural level population compared to the national average.

Methods

The Karşıyaka Hypertension Prevalence and Awareness Study (KARHIP) was planned and fulfilled by internal resources of the Association of Hypertension Control (İzmir, Turkey, http://www.hipertansiyonmd.com/). Fieldwork was done by educated and dedicated personnel at Karşıyaka Municipality Building by one by one interviewing poll, blood pressure measurement, rhythm and body composition analysis.

1417 people (627 male, 790 female) were surveyed in this study. All of the people over age 18 who had given written consent were included. Informed consent was obtained for all patients in accordance with 2013 statements of the Declaration of Helsinki related to "Ethical Principles for Medical Research Involving Human Subjects". People with cognitive disorders who could not understand the poll questions or who were not able to answer clearly and pregnant women were excluded.

Field work of the study (poll, blood pressure measurement, rhythm and body composition analysis) was done in February 2014. The personnel doing field work of the study were educated specifically for the purpose of the study, poll interview technique, blood pressure measurement, rhythm and body composition analysis. These educated personnel used a standard poll assessing demographic data, life style, diagnosis and treatment of hypertension and accompanying risk factors.

Blood pressure measurements were done after the poll interview, with an automated blood pressure measuring device (AND UA-1020, A&D Company, Saitama, Japan) from the upper arm with different cuff sizes appropriate for each patients arm with the oscilometric method. Each measurement was done after a period of 15 minutes rest, while seated, and from both arms, and the arm with the higher pressure was used for the following measurements. If the blood pressure difference between two arms exceeded 10 mmHg, continous measurements were done until two measurements were close enough. The average of three measurements was used in all patients to calculate prevalance.

Hypertension was defined as an average systolic blood pressure ≥140 mmHg or an average diastolic blood pressure ≥90 mmHg. Also patients with a previous diagnosis of hypertension and/or using antihypertensive medication were considered hypertensive. Isolated systolic hypertension was defined as an average systolic blood pressure ≥140 mmHg and a diastolic blood pressure <90 mmHg and isolated diastolic hypertension was defined as an average systolic blood pressure <140 mmHg and a diastolic blood pressure ≥90 mmHg.

Awareness of hypertension was defined as a previous diagnosis of hypertension made by a health care professional. Being under hypertensive treatment was defined as taking antihypertensive medication on the poll questions. Controlled Hypertension was assessed during poll by directly measuring blood pressure and defined as an average systolic blood pressure <140 mmHg and a diastolic blood pressure <90 mmHg.

Rhythm analysis was done with single channel electrocardiography device (Handheld ECG Monitor, Beijing Choice Electronic Tecnology Co. Ltd, Beijing, China) and patients with atrial fibrillation were identified. Segmental body composition analysis, body-mass index and waist-hip ratio measurements were done automatically with a BiospaceInbody 230 device (Biospace Co., Ltd, Seoul, Korea).

Descriptive analysis of demographic and other data for numerical variables were done as average and standard deviation, whereas for categorical variables frequency tables including lines and columns were used. Chi-sqauare test was used to compare rates where appropriate. T-test was used to compare normally distrubuted numerical variables. p<0.05 was accepted as statistically significant. All data was analysed using "SPSS 10.0 for Windows" (SPSS Inc., Chicago, Illinois, ABD) software.

Results

1417 people were included into the study, 627 (44.2%) males, 790 females (55.8%). Age-adjusted distrubution of the patients and body-mas index, body fat ratio, waist-hip ratio, basal metabolic rate and average systolic and diastolic blood pressure values are listed in Table 1.

Average systolic blood pressure of the entire group was 132.9±19.3 mmHg, average diastolic blood pressure of the entire group was 82.6±10.7 mmHg. Average systolic blood pressure was found to increase with age in both sexes. Average systolic blood pressure was found to be higher in men than women in all age groups except for the group over 80 years. Average diastolic blood pressure also tends to increase with age in both sexes but starts to decrease after age 60. Average diastolic blood pressure levels were higher in males before 60 years old but were unchanged after 60 years of age.

Out of a total of 1417 people enrolled, 637 people were normotensive and 780 were hypertensive (blood pressure >140/90 mmHg or taking antihypertensive treatment. Age and sex distrubuted prevalences of hypertension are listed in Table 2. The prevalence of hypertension was found to increase with age. The prevalence of hypertension in females in the age group between 30 and 39 was 19.2%, in males 15.5%; in 40-49 year old females 25.6%, in males 40-49 years old 48% ; in 50-59 year old females 45.8%, in 50-59 year old males 52.8%; in 60-69 year old females 69.6%, in 60-69 year old males 70%; in 70-79 years old females 72.3%, in 70-79 years old males 84.5% and in females over 80 years it was 94.4% and in males over 80 years it was 84.6%. The prevalence of hypertension in the entire group was 55%, being 60.9 % in males 50.4% in females.

The prevalence of isolated systolic hypertension overall was 5.8% and was significantly higher in males (9.1%) compared to females (2.8%, p=0.0001), and was found to increase with age. The prevalence of isolated diastolic hypertension overall was 3.1 % and was significantly higher in females (3.8 %) compared to males (2.1 %, p-0.004). Isolated systolic and diastolic hypertension prevalences in the study population are listed in Table 3.

According to the European Society of Cardiology 2013 Hypertension Treatment Guidelines hypertension grading, 34.7% of the patients were under 140/90 mmHg, 43.2% of the

Table 1. Distribution of the study population according to age group, characteristics and systolic and diastolic blood pressures.

Chatacteristic		Female	Male	p
Age groups, nº (%)	18-29	26 (1.8)	17 (1.2)	0.001
	30-39	52 (3.7)	45 (3.2)	
	40-49	117 (8.3)	75 (5.3)	
	50-59	264 (18.6)	161 (11.4)	
	60-69	230 (16.2)	200 (14.1)	
	70-79	83 (5.9)	103 (7.3)	
	80 ≤	18 (1.3)	26 (1.8)	
	Overall group	790 (55.8)	627 (44.2)	
Age, mean (sd#)		56.25 (12.3)	58.80 (13.3)	0.000
BMI*,mean, kg/m2		27.7	27.4	NS$^\psi$
Body Fat Composition** (%), mean		37.6	27.8	0.000
WHR&,mean		0.9320	0.9301	NS$^\psi$
BMR$^\phi$, mean		1320.2	1637.7	0.000
Systolic blood pressure, mean of the age group, (sd#)	18-29	112	126	0.003
	30-39	118	131	0.000
	40-49	122	133	0.000
	50-59	127	136	0.000
	60-69	133	141	0.000
	70-79	137	145	0.004
	80 ≤	146	144	NS$^\psi$
	Overall group	128.5	138.4	0.000
Diastolic blood pressure, mean of the age group, (sd#)	18-29	72	75	NS$^\psi$
	30-39	80	83	NS$^\psi$
	40-49	82	87	0.000
	50-59	82	86	0.000
	60-69	84	83	NS$^\psi$
	70-79	81	80	NS$^\psi$
	80 ≤	82	77	NS$^\psi$
	Overall group	82.0	83.5	0.011

** BFC: Body Fat Composition,$^\phi$: BMR: Basal Metabolic Rate,* BMI: Body- Mass Index, $^\psi$NS: nonsignificant, $^\Omega$n: Number, #sd: Standard Deviation, & WHR: Waist-Hip Ratio,

patients were Grade I hypertensive, 18.5% of the patients were Grade II and 3.6% of the patients were Grade III hypertensives (Figure I) [6].

Rates of Awareness, Treatment and Control of Hypertension: 564 out of 780 hypertensive people were aware of their disease (awareness rate: 72.3%) whereas 216 (27.7%) people were not aware of their disease. Hypertension awareness rate was higher in females than in males (76.6% vs 67.8%, p<0.05). Awareness

increased over 30 years of age and was higher in females in all age groups. 541 out of 780 (69.4%) hypertensive patients were under antihypertensive treatment 244 people (63.8 %) in males, and 297 (74.6%) in females. Hypertension control rate was 34.7% (271 people) overall, in males it 29.6% (113) and in females 39.6% (158), whereas the rate of adequate control was 50.1% in 541 patients who were aware of their disease, 46.3% in males and 53.1% in females. Age and sex distributed rates of antihypertensive treatment and blood pressure control rates are summarised in Table 4.

Concomitant Risk Factors with Hypertension: 27.9% of all hypertensive patients (31.4% of the males, 24.6% of the females) were scanned for proteinurea at least once, the ratio of which is significantly higher in males than females (p<0.05). It was found that in both sexes albuminuria scanning was done significantly more frequently in age 40-80 group than age 18-30 group (p<0.005).

Mean Body-Mass Index in hypertensive population was 28.4 kg/m^2 , whereas it was 26.6 kg/m^2 in the normotensive population (p=0.0001). There was a weak but statistically significant correlation between BMI and hypertension prevalance (r=0.220, p=0.0001). 19.6% of the overall group had prediagnosed diabetes mellitus. 76.2% of the diabetic group was under treatment and 66.4% of the group said their blood glucose level was controlled. 33% of the group had a hyperlipidemia diagnosis and 38% of them were under drug treatment for this. Diabetes mellitus, hyperlipidemia, obesity, coronary artery disease, revascularisation history, renal disease and exercising other than walking rates are significantly higher in hypertensive people. Risk factor presence, comorbidities and life-style habits in hypertensive and normotensive people are summarised in Table 5.

Table 2. Age and sex distrubuted prevalances of hypertension

Characteristic		Hypertensives			
		Female	Male	Total	p
Age groups, nº (%)	18-29	0	5 (29.4)#	5 (12)*	0.006
	30-39	10 (19.2)#	7 (15.5)#	17 (18)*	NS*
	40-49	30 (25.6)#	36 (48)#	66 (34)*	0.002
	50-59	121 (45.8)#	85 (52.8)#	206 (48)*	NS$^\psi$
	60-69	160 (69.6)#	140 (70)#	300 (70)*	NS$^\psi$
	70-79	60 (72.3)#	87 (84.5)#	147 (79)*	0.033
	80 ≤	17 (94.4)#	22 (84.6)#	39 (89)*	NS$^\psi$
	Overall group	398 (50.4)&	382 (60.9)&	780 (55)a	NS$^\psi$

$^\psi$NS: Nonsignificant, $^\Omega$n: number, #: Percentage in the same age and sex group &: Percentage in the same sex group * : Percentage in the same age group, a Percentage in overall group.

Discussion
Prevalence

Hypertension prevalence in this study population from Karşıyaka district was 55 %. This rate was higher than the prevalence rate found in other national and regional hypertension prevalence studies. Hypertension prevalence in national studies was 33.7% in TEKHARF [7] in 1991, 28.9% in TURDEP 1 in 2002 [8], 31.8 % in PATENT in 2003 [4], 31.3 % in TURDEP 2 in 2010 [9], 30.3% in PATENT 2 in 2012 [5]. Also in Turkey Chronic Diseases Survey, which was conducted by Ministry of Health in cooperation with Family Physicians, prevalence was 24% which was lowest of all times in our country [10].

In regional hypertension prevalence studies, hypertension prevalence was 29.6% in Aydın in 1999 [11], 33.4% in Gemlik in 1999 [12], 33.7% in Kocaeli in 2000 [13], 33.6% in second study in Kocaeli in 2009 [14], 44.0% in Trabzon in 2009 [15], 40.8% in Balçova province of İzmir in 2009 [16] and 42% in Düzce in 2010 [17].

In epidemiologic studies of hypertension prevalence, prevalence rates differ from country to country and from region to region also due to the methodology used. In a review published in 2003 evaluating epidemiological studies, hypertension prevalence in Europe was higher than North America (USA and Canada) (44.2 % vs 27.6%) and the highest rate was in Germany (55%) [18]. Regional differences were also found in national studies. In PATENT 2012 cohort, Southeastern Anatolian region was the one with lowest hypertension prevalence rates (22.2%), whereas this rate was 29.5% in Aegean region and 38.7% in the Eastern Blacksea Region [5]. In 2011 Turkey Chronic Diseases and Risk Factor Prevalance survey, again the Southeastern Anatolian region was the one with the lowest hypertension prevalance (16%) and the West Marmara region had the highest prevalence rate (35%) [10].

In our study, hypertension prevalence increased with age, as in previous studies. Prevalence was 18% in age group 30-39, 34% in age group 40-49, 48% in age group 50-59, 70% in age group 60-69, 79% in age group 70-79, 89% in the age group over 80. In the Turkish Hypertension Prevalence Study cohorts 2003 and 2012, these rates were 21% and 11.5% in age group 30-39, 39% and 29% in age group 40-49, 56.4% and 53.6 % in age group 50-59, 79% and 67.9% in age groups 60-69, 76.0% and 85.2% in age group 70-79 and 79.7% and 76.3% in age group over 80, correspondingly. In middle age group (age 35-65) hypertension
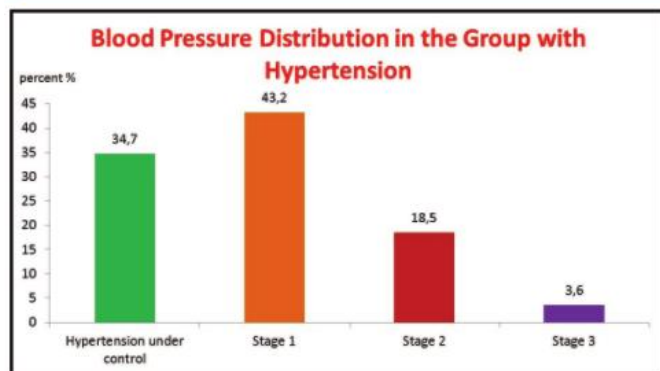
Table 3. Age and sex distrubuted prevalances of isolated systolic and diastolic hypertension

Characteristic	Hypertansive			
	Female	Male	Total	
Isolated systolic hypertension Age groups, n (%)				
	18-29	0	3 (17.6)#	3 (6.9)*
	30-39	0	0	0
	40-49	1 (0.8)#	5 (6.6)#	6 (3.1)*
	50-59	10 (3.8)#	10 (6.2)#	20 (4.7)*
	60-69	8 (3.4)#	18 (9)#	26 (6)*
	70-79	3 (3.6)#	19 (18.4)#	22 (11.8)*
	80 ≤	0	2 (7.7)#	2 (4.5)*
	Overall	22 (2.8)&	57 (9.1)&	79 (5.6)a
Isolated diastolic hypertension Age groups, n (%)				
	18-29	0	0	0
	30-39	6 (11.5)#	0	6 (6.2)*
	40-49	11 (9.4)#	2 (2.6)#	13 (6.8)*
	50-59	8 (3)#	8 (4.9)#	16 (3.8)*
	60-69	4 (1.7)#	3 (1.5)#	7 (1.6)*
	70-79	1 (1.2)#	0	1 (0.6)*
	80 ≤	0	0	0
	Overall	30 (3.8)&	13 (2.1)&	43 (3.1)a

ΨNS: nonsignificant, n: number, #: Percentage in the same age and sex group, &: Percentage in the same age group, * Percentage in the same sex group, a Percentage in overall group.

prevalence in our study, and PATENT 2003 and 2012 groups were 46%, 42.3% and 46%; in geriatric population (>65) 79%, 75% and 78%, correspondingly. It is seen that hypertension prevalence rates are similar if evaluated in the age groups. In our KARHIP study population, age group under 30 is represented 3% and age group under 40 is represented 9.8%. So our population is mostly over the age of 50 (76.5% of the whole population), and a high hypertension prevalence is an expected finding.

In almost all previous studies, hypertension was found to be more common in females, whereas in our study hypertension was more prevalant in males (60.9%) than females (50.4%).

Awareness, Treatment and Control Rates

With the increase of public communication tools, the commencement of family physician systems, media campaigns conducted by Ministry of Health and Cardiology Associations, awareness of hypertension has increased all over the country [19]. National PATENT study results shows these positive effects. In PATENT 2003 cohort awareness rate was 40%, treatment rate was 31%, overall control rate in all hypertensives was 8%, control rate in treated hypertension was 20%. In PATENT 2012 cohort these rates were significantly increased; awareness rate was 54.7%, treatment rate was 47.5%, overall control rate in all hypertensives was 28.7%, control rate in

Figure 1.

Table 4. Age and sex distributed rates of antihypertensive treatment and blood pressure control rates.

Characteristic	Control of Hypertension		
	Female	Male	Total
Age groups, n$^{\Omega}$ (%) **Being under antihypertensive treatment rate of hypertensive patients**			
18-29	0	1(20)#	1 (20)*
30-39	4(40)#	1 (14.3)#	5 (29.4)*
40-49	14(43.3)#	18 (50)#	32 (48.5)*
50-59	80 (66.1)#	49 (57.6)#	129 (62.6)*
60-69	132 (82.5)#	100 (71.4)#	232 (77.3)*
70-79	52 (86.6)#	58 (66.6)#	110 (74.8)*
80 ≤	15 (88.2)#	17 (77.2)#	32 (82.1)*
All age groups	297 (74.6)&	244 (63.8)&	541 (69.4)a
Age groups, n$^{\Omega}$ (%) **Control rate of hypertension**			
18-29	0	0	0
30-39	2 (20)#	0	2 (117)*
40-49	9 (30)#	7 (19.4)#	16 (24.2)*
50-59	51 (42.1)#	21 (24.7)#	72 (34.9)*
60-69	66 (41.2)#	48 (34.2)#	114 (38)*
70-79	25 (41.6)#	28 (32.1)#	53 (36.1)*
80 ≤	5 (29.4)&	9 (40.1)&	14 (35.9)*
All age groups	158 (39.6)&	113 (29.6)&	271 (34.7)a

$^{\Psi}$NS: nonsignificant, $^{\Omega}$n: number, # Percentage in the same age and sex hypertensive group * Percentage in the same age hypertensive group, & Percentage in the same sex hypertensive group,a Percentage in overall hypertensive group

treated hypertension was 53.9% [5]. In KARHIP population awareness rate was 72.3%, treatment rate was 69.4%, overall control rate in all hypertensives was 34.7%, control rate in treated hypertension was 50.1%. Compared with PATENT 2012 cohort results, awareness rates (54.7 % vs 72.3) and treatment rates (47.5% vs 69.4%) were higher in the KARHIP population. Meanwhile, the overall control rate in all hypertensives (28.7% vs 34.7%) and the control rate in treated hypertension (53.9 % vs 50.1%) were not significantly different. Similar to the PATENT 2012 cohort, awareness rate (KARHIP female 77 %, male 68%, PATENT 2 female 66.9%, male 40.6%), treatment rate (KARHIP female 74.6%, male 63.9%, PATENT 2 female 59.7%, male 33.5%) and hypertension control rate (KARHIP female 39.7%, male 29.6%, PATENT 2 female 37.3%, male 18.9%) were higher in females than males.

Concomitant Risk Factors:

Some concomitant risk factors, comorbidities and treatment factors are also invastigated in the Karşıyaka Hypertension Prevalance and Awereness Study. A relation is known to exist between body-mass index (BMI) and hypertension. Mean body-mass index in hypertensive people was found to be 28.4 kg/m^2, whereas in the normotensive population it was 26.6 kg/m^2. A weak but statistically significant linear correlation was detected between BMI and hypertension prevalance. 19.6 % of the people declared to have a Type II diabetes diagnosis. In the national TURDEP-2 Study, representing the entire population, a diabetes prevalance of 16.5% was found [9]. 76.2% of the people with a diabetes diagnosis were under treatment and 66.4% of them had regulated blood glucose level. 33% of the overall group declared to have hyperlipidemia, 38% of whom were declared to take medication. In the Turkish Heart Study, hyperlipidemia rates were 32% in males and 22% in females, which is similar to our study [20]. As expected, prevalances of diabetes mellitus, hyperlipidemia, obesity, coronary heart disease, stroke and renal diseases were higher in hypertensive people, and regular exercising other than walking was also higher in hypertensives.

Table 5. Risc factor presence, comorbities and habits in hypertensive and normotensive people

Risc factors , comorbities and habits	Hypertensives (n:780)	Normotensives (n:637)	p
Diabetes mellitus (n,%)	197 (25.3)	80 (12.6)	0.000
Smoking (n,%)*	236 (30.3)	245 (38.5)	NS
Hyperlipidemia (n,%) **	292 (42)	175 (32.1)	0.000
Obesity (n,%)	253 (32.4)	104 (16.3)	0.000
Coronary artery disease history (n,%)***	215 (29.7)	48 (8.4)	0.000
Revascularisation history (n,%)	92 (11.8)	14 (2.2)	0.000
Stroke history (n,%)	40 (5.1)	12 (1.9)	0.001
Renal disease history (n,%) ****	42 (5.7)	17 (2.9)	0.009
Exercising (other than walking) (n,%)	391 (50.1)	268 (42.1)	0.002
Salt ading habit(n,%)	165 (21.2)	119 (18.7)	NS
Routine olive oil usage (n,%)	736 (94.4)	596 (93.6)	NS

NS:nonsignificant , *Active and previous smokers are included. ** 175 people(84 hypertensive,91 normotensive) did not know whether they have hyperlipidemia or not, *** 123 people(55 hypertensive,68 normotensive) did not know whether they have coronary disease or not, **** 82 people(39 hypertensive, 43 normotensive) did not know whether they have renal disease did not included.

Study Limitations

In the KARHIP population, the age group under 30 was only represented as 3% , and the age group under 40 is represented only by 9.8%. So the KARHIP population mostly represented those aged over 50. These results may also imply a trend of of hypertensive population to enroll in study selectively based on age. This was a project executed in a high sociocultural district, so the results should not be extraploated to Izmir or the whole of Turkey.

Conclusions

As a result, the Karşıyaka Hypertension Prevalence and Awareness Study (KARHIP) showed that hypertension is an epidemic health problem in Turkey, and even though awareness and treatment rates incease in urban areas, control rates are still far removed from targets. Moving from the fact that hypertension is a preventable disease, hypertension should be prevented with life style changes starting from childhood, measures should be taken in every age group, and when hypertension develops an early diagnosis and effective treatment are required.

Declarations of Interest

The authors declare no conflicts of interest. There is no sponsor or funding support of any kind.

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