

The Incidence and Awareness of Hypertension, among Adults in Ahvaz: A 5-Year Cohort Study in Southwestern Iran

Abstract

Background: According to the World Health Organization in 2009, hypertension is responsible for 13% of all deaths. Hypertension can increase the risk of stroke, coronary artery disease, dementia, heart disorder, kidney, and other chronic diseases. In this study, the prevalence and incidence of hypertension and knowledge and awareness of it among adults in Ahvaz are investigated. **Methods:** This cohort study was carried out on 688 participants in a study on the prevalence of metabolic syndrome investigated in adults in the city of Ahvaz in 2009. In 2014, participants were again recruited. Based on the standard method and disease history, blood pressure, height, and weight were measured, and a demographic information questionnaire was completed through interviews. **Results:** In this study, 688 individuals over 20 years of age participated with an average age of 42.7 ± 13.3 years, 300 men (43.6%), and 388 women (56.4%). Hypertension incidence was 65/1000 person-years which included 67.7 and 57.8/1000 person-years in men and women, respectively. The awareness of patients about hypertension was 51.2% in phase 2 (hypertension new cases). **Conclusions:** In this study conducted in Ahvaz, the incidence rate of hypertension was 65/1000 person-years, higher in men than women. Hypertension awareness was 50.5%, 45.1% in men, and 55.1% in women.

Keywords: Awareness, cohort studies, hypertension, incidence

Introduction

Hypertension has been known as a common cause of deaths and chronic diseases in most countries, especially Western countries.^[1] More than 360 thousand deaths in 2013 in America were due to primary or secondary hypertension (about 1000 deaths daily).^[2]

Hypertension is also one of the main causes of premature death worldwide, is associated with about 9.4 million deaths every year, and is still expanding. From among all the regions of the World Health Organization, Africa with 46% and America with 35% had the highest and lowest prevalence, respectively.^[3] Hypertension constitutes about 13% of all deaths and is the strongest risk factor for hurting the individuals' healthy lifestyle.^[4] It also increases the risk of stroke, coronary artery disease, heart and kidney failure, and other chronic diseases.^[5-7]

Several studies have investigated the prevalence of hypertension around the world.^[8,9] Furthermore, in Iran, some studies have been carried out which revealed

that 22.2% of people over 15 years of age in Isfahan are suffering from hypertension.^[10] Moreover, lipid and glucose study in 20–69 years old patients in Tehran showed that 22% are suffering from hypertension.^[11] The prevalence of hypertension in rural populations is 18.4%^[12] and in adults in the city of Ahvaz is 17.58%, 46.4% of them being aware of their hypertension condition.^[13]

Few studies have been conducted on the incidence of hypertension. In previous studies, depending on age, gender, ethnicity and body size, the incidence of hypertension has been reported in the range of 3%–18%.^[14] In a cohort study in Portugal with a median time of 3.8 years from 1999 to 2003, the incidence of hypertension was 47.3/1000 person-years.^[15] Furthermore, in the study conducted in Kashan (Iran), (2013), the incidence of hypertension was 50/1000 adult person-years.^[16] The aim of this study was to investigate the incidence and the level of awareness of hypertension, among people over 20 in Ahvaz in a 5-year cohort study from 2009 to 2014.

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Methods

In this cohort study, participants were selected from individuals who participated in a cross-sectional study on the prevalence of metabolic syndrome in adults, which was carried out in Ahvaz in 2009.^[17] Out of 24 health centers, six centers were selected by stratified random sampling. After obtaining written consent from the participant, they were invited to the centers with prior coordination. Blood pressure, height, and weight were measured and demographic information obtained through a questionnaire. Nine hundred and forty-four individuals participated in the baseline study, 166 of whom having been diagnosed with hypertension and 90 were unavailable or refused to continue, and finally, 688 people were reexamined 5 years later [Figure 1].

- Obesity was calculated based on body mass index (BMI) by dividing weight in kilograms to the square of height in meters. A BMI range of 25–29.99 was considered overweight, ≥ 30 , obese and < 25 normal
- At least 15 min after rest, systolic blood pressure (SBP) and diastolic blood pressure (DBP) from the right arm (in suspended posture) were measured twice within 30 min in a seated position with Mercury manometers and putting Stethoscope under cuff. Mean twice measurement was recorded as the BP. To record BP Korotkoff sounds in phases one and five, preferably with the stethoscope bell was heard and blood pressure numbers in the first and fifth phases of Korotkoff recorded as systolic and DBP, respectively

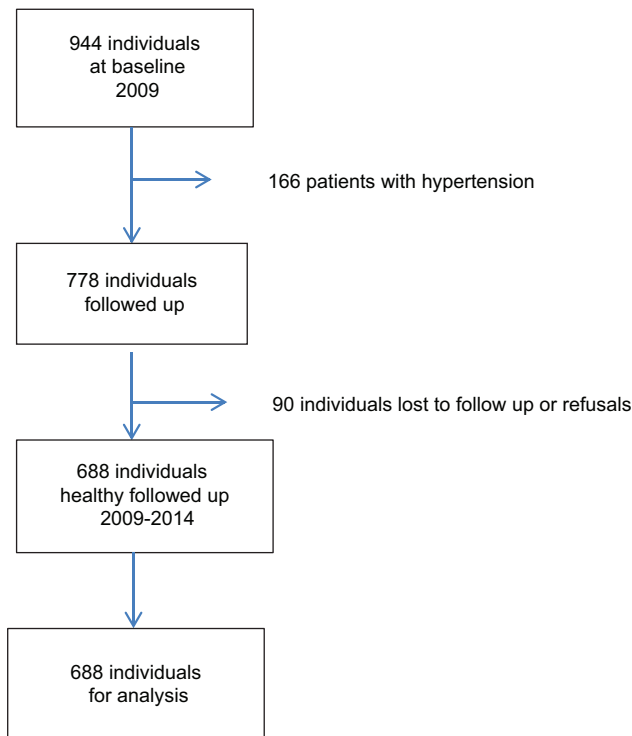


Figure 1: Flowchart illustrating the sample selection for the present analysis

- According to the American diabetes association, hypertension is defined as (SBP ≥ 140 /DBP ≥ 90 mmHg) or taking BP medication (on therapy)^[18]
- Family history of hypertension: hypertension in at least one first-degree relative
- Waist circumference (WC) abnormal: WC ≥ 102 in men and WC ≥ 88 cm in women.

The collected data were entered into IBM SPSS statistical software (version 20, SPSS Inc., Chicago, IL, USA), and the data were analyzed using paired *t*-test, independent *t*-test, ANOVA, Chi-square, and logistic regression. $P < 0.05$ was considered statistically significant.

Results

A total of 688 healthy individuals over 20 years of age including 300 men (43.6%) and 388 women (56.4%) with an average age of 42.7 ± 13.3 years participated in this study. The cumulative incidence of hypertension was 26.8% that is equal to 65/1000 person-years (67.7 in men and 57.8 in women). The awareness in Phase 2 among adult patients in Ahvaz was 50.5% (male 45.1% and female 55.1%). Awareness of hypertension in the age groups of 20–39 was 35%, 40–59, 59%, and ≥ 60 years 76.1%, with increasing with age. 18.3% of people who reported having high blood pressure did not take medication.

A detailed comparison of systolic and diastolic, mean blood pressure, and incidence of hypertension are shown in Tables 1 and 2.

Discussion

This cohort study was carried out on people over 20 years of age in Ahvaz in Southwestern Iran in the 5-year period from 2009 to 2014. The cumulative incidence of hypertension was 26.8% (65/1000 person-years). The average SBP increased from 112.1 ± 11.2 to 115.6 ± 15.4 mmHg and DBP from 69.5 ± 10.1 to 71.1 ± 15.4 mm Hg in people without hypertension in baseline; this perceptible increase may be due to the participants' rising age, weight, or lifestyle change.

In phase 2, there was an increase in mean DBP In married individuals, the Fars ethnicity, and those with a family history of hypertension.

SBP also increased in both genders, overweight and obese individuals, ages 40–60 years old, Arab and Fars, with and without family history.

In baseline population, 46.4% of the patients were aware of their hypertension;^[13] this awareness increased to 50.5% in phase 2 among adult patients in Ahvaz without hypertension in baseline. The awareness results in different studies were as follows: Tehran (50%),^[12] Saudi Arabia (44.7%),^[9] India (33% in 2007 and 42.9% in 2010),^[19] England (65%, 2006),^[20] USA (81%, 2007–2010),^[21] and Canada (83%, 2007–2009),^[22] all of which are higher than

Table 1: Comparison of systolic and diastolic mean blood pressure in people without hypertension in baseline study between phases 1 and 2 in terms of demographic variables

Variable	SBP		P	DBP		P
	Phase 1	Phase 2		Phase 1	Phase 2	
Sex						
Male	114±11	116.6±14.5	0.03	71.5±5	73.0±10	0.18
Female	110±11	114.6±16.2	<0.001	67.7±10	69.4±15.2	0.11
P	<0.001	0.02		<0.001	0.004	
BMI						
<25	111±11.1	112.9±13.3	0.12	67.9±10.7	68.6±13.2	0.07
25.29-29.99	112.6±11.1	116±15.7	0.012	70.6±9.6	72.6±15.2	0.16
≥30	112.6±11.5	118.6±16.9	<0.001	69.9±10.1	73.5±16.8	0.68
P	0.29	<0.001		0.046	0.002	
Age						
20-29	109.8±10.2	109.7±11.0	0.89	67.6±10.3	67.2±14.5	0.79
30-39	109.9±11.8	110.2±12.2	0.86	68.3±9.8	68.7±13.1	0.77
40-49	112.2±11.2	116.5±15.2	0.006	69.2±10.2	71.5±17.3	0.13
50-59	114.9±11.2	124.7±17.9	<0.001	72±10.1	75.1±16.1	0.08
60-69	118.2±8.6	122.8±13.8	0.18	72.6±9.5	78.7±12.4	0.07
≥70	116.0±10.7	124.0±17.1	0.8	75±8.5	75.0±12.7	0.99
P	<0.001	<0.001		0.004	0.006	
Married						
No	112±9.1	108.6±10.5	0.049	69.5±8.5	67.6±13.7	0.34
Yes	112.1±11.5	116.6±15.7	<0.001	69.5±10.4	71.5±15.6	0.012
P	0.98	<0.001		0.97	0.036	
Ethnicity						
Arab	111.1±11.5	113.8±14.8	0.049	69±10.0	68.9±13.8	0.34
Fars	113.2±11.3	119.2±17.1	<0.001	70.1±9.6	74.7±16.1	0.012
P	0.04	<0.001		0.22	<0.001	
Family history of hypertension						
No	112.3±10.7	115.0±15	0.004	69.5±10.1	70.8±15.8	0.17
Yes	111.6±12.4	117.5±15.9	<0.001	69.2±10.5	72.6±14.1	0.008
P	0.46	0.022		0.10	0.06	
WC						
Normal	115.85±15.9	115.4±15.8	0.99	71.67±11.37	70.8±15.8	0.17
Unmoral	120.0±16.50	120.0±16.5	0.27	72.32±13.3	72.6±14.1	0.008
P	0.027	0.003		0.58	0.06	

WC=Waist circumference, SBP=Systolic blood pressure, DBP=Diastolic blood pressure, BMI=Body mass index

Ahvaz. In phase 2, however, the awareness level in Ahvaz was more than that of Saudi Arabia and India, while lower than Iran (Tehran), England, USA, and Canada. This study shows the awareness of hypertension to be 43.8% in males and 53.3% in females in Ahvaz. Awareness of hypertension in this study increases with age, similar to the results of studies in Britain, The United States, and Canada.^[23]

In participant with higher age 45 years in cohort study in the adult population of the city of Halle/Saale in eastern Germany, the awareness of hypertension was 69% in men and 80.9% women^[24] that higher than in Ahvaz (male 45.1% and female 55.1%).

The prevalence of hypertension in adult who have reported their hypertension in Tehran (2011) was 5.27% (6.64% in women and 3.83% of men) and the annual incidence was 6.87/1000 person-years (8.43 in women

and 5.26 in men), which is much lower than results of nonself-report studies^[25] due to lack of awareness.

The cumulative incidence of hypertension in Ahvaz was 26.8% (65/1000 person-years) which is considerably higher than that of Portugal (47.3/1000 person-years),^[15] Canada (22.1/1000 person-years)^[26] and India (23.6/1000 person-years)^[19] but lower than Indian study (80.5/1000 person-years) (with 2 years follow-up),^[27] and also lower than the Thai open university students study (the overall 4 years incidence of hypertension was 3.5%, also lower than Ahvaz).^[28]

The incidence of hypertension in men and women in Ahvaz was 67.7 and 57.8/1000 person-years respectively, which is similar to the results obtained in Canada (men 22.7 > 21.6 women per 1000 person-years), Portugal (men 52.7 > 43.4 women per 1000

Table 2: Incidence of hypertension in healthy people in baseline study and odds ratio in terms of demographic variables

	Cumulative incidence	OR 95% CI
Sex		
Male	29	1
Female	25.3	1.15 (0.71-1.87)
<i>P</i>	0.27	
BMI		
<25	18.1	1
25-29.99	25.7	1.4 (0.79-2.5)
≥30	32.8	1.88 (1.01-3.5)
<i>P</i>	0.013	
Age		
20-29	1	13.2
30-39	9.8	0.49 (0.2-1.19)
40-49	24.6	1.27 (0.59-2.76)
50-59	44.1	3.1 (1.41-6.8)
60-69	58.1	4.86 (1.78-13.2)
≥70	32.6	5.25 (1.11-24.7)
<i>P</i>	<0.001	
Married		
No	11.3	1
Yes	28.3	1.24 (0.48-3.23)
<i>P</i>	0.013	
Ethnicity		
Arab	18.9	1
Fars	32.7	1.75 (1.08-2.82)
<i>P</i>	<0.001	
Family history of hypertension		
No	24	1
Yes	34.6	1.8 (1.8-2.9)
<i>P</i>	<0.001	
Smoking		
No	27.3	1
Yes	24.4	0.69 (0.26-1.78)
<i>P</i>	<0.001	
Diabetes mellitus		
No	22.7	1
Yes	47.7	2.23 (1.17-4.26)
<i>P</i>	<0.001	

OR=Odds ratio, BMI=Body mass index, CI=Confidence interval

person-years),^[15] India men 93.1 > 70.9 women per 1000 person-years,^[27] and the Thai study male 5.2% >2.1% female.^[28]

There was a significant relationship between the incidence of hypertension and BMI, age, family history of hypertension, and ethnicity. In Thai Open University students study hypertension was associated with age, higher BMI, and comorbidities.^[28] Furthermore, the risk of hypertension in >50 age group was at least three times higher than 20–29 age groups. A study in the city of Kerala in India showed that the risk of hypertension

in people over 35 years of age was four times higher than people below 35.^[19] In another India study, the risk for developing hypertension was associated with age, low socioeconomic status, current alcohol use, being overweight, prehypertension, and dysglycemia. Awareness of hypertension in women is more than men.

Conclusions

The incidence of hypertension was reported 65/1000 person-years and with higher rate in men compared to women in Ahvaz. The level of awareness was 50.5% among adult patients without hypertension in baseline, with awareness in women greater than men. Awareness of hypertension in Ahvaz increases with age.

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Conflicts of interest

There are no conflicts of interest.

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