

# Prevalence of Hypertension and Cardiovascular Risk Factors among Adults in Urban Populations - Iran

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## A-R-T-I-C-L-E I-N-F-O

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## A-B-S-T-R-A-C-T

**Background & Aims of the Study:** Hypertension was introduced as the strongest risk factor for CVD events in an Iranian population. The aim of this study was to measure the amount of undiagnosed hypertension and selected cardiovascular risk factors present among an adult population through opportunistic screening.

**Materials & Methods:** This cross-sectional opportunistic screening program was carried out in a PHC in urban areas of Ardabil city on 354 patients and accompanying persons aged 30 years and above who attended were included. Known hypertensive patients and pregnant women were excluded. The study participants were interviewed using a pre-tested semi-structured interview schedule to collect data regarding socio-demographic variables. Blood pressure (BP) was measured for all participants. Data were analyzed with SPSS version 18 using chi-square test.

**Results:** A total of 354 participants were screened; 55.1% were females. Mean (SD) of age of the participants was 48.4 (12.4) years. Hypertension and pre-hypertension were present in 18.6% (66/354) and 39.3% (139/354) of the participants respectively. 19.2% (68/354) of all participants were current users of tobacco. Generalised obesity was present in 32.5% (115/354) of the participants while 18.1% (64/354) were overweight. 44.9% (159/354) participants had central obesity.

**Conclusions:** The prevalence of hypertension and prehypertension is high, and the results demonstrate the urgent need to develop effective national strategies to improve prevention of hypertension including life style modifications strongly recommended.

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## Background

In recent decades rapid social and economic changes have led to the increment in prevalence of cardiovascular risk factors such as blood pressure in Mediterranean and Middle Eastern countries (1) and the prevalence of CVD risk factors in Iranian adult and younger populations was high and according to recent study in Iran,

aged 30 or older, 78% of men and 80% of women presented at least one CVD risk factor. Hypertension (HTN) was presented in 20.4% of adults (2). The national surveillance study demonstrated Approximately 25% or 6.6 million Iranians aged 25-64 years had hypertension; additionally 46% or 12 million Iranians aged 25-64 years had pre hypertension. Hypertension and pre hypertension were

associated with obesity, central obesity, hypercholesterolemia, and diabetes (3) On the other hand, HTN was introduced as the strongest risk factor for CVD events in an Iranian population (4,5).

Hypertension is an established major risk factor underlying the epidemic of coronary and cardiovascular diseases (6).

Globally, morbidity and mortality due to Non-Communicable Diseases (NCDs) is on the rise. The major risk factors found responsible for the rising trends of NCDs in the Asian regions include raised blood pressure, tobacco, unhealthy diet (low in fruits and vegetables and high in salt, fat, and sugar), physical inactivity (sedentary life style) (7).

The literature review shows that the prevalence of hypertension in Iran is estimated to be extensive and rationally increasing the hypertension prevalence would lead to an increase in the prevalence of cardiovascular disease risk factors and chronic health diseases. Not surprisingly, the incidence of stroke and prevalence of coronary artery diseases, coronary risk factors, and metabolic syndrome. Furthermore, non-communicable diseases such as cardiovascular diseases are the main of adult mortalities pertaining to various risk factors (8).

There is paucity of literature regarding opportunistic screening of hypertension and associated cardiovascular risk factors from urban area of Iran. Unfortunately, despite of guidelines issued by the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular disease, opportunistic screening for hypertension and diabetes in  $\geq 30$  years of age was not done by the health workers at the Sub center level and referred to the Urban Health Centers (UHC) according to our knowledge, this is the first screening study in northwest of Iran and all of the previous studies on prevalence of hypertension were conducted in capital and central provinces. There is also no mention of opportunistic screening for other

NCD risk factors at the primary care level. We wanted to test this assumption of not involving PHC and to see the feasibility and usefulness of screening for NCD risk factors at the level of PHC.

**Aims of the study:** The present study was thus undertaken to measure the amount of undiagnosed hypertension and selected cardiovascular risk factors present among an adult population through opportunistic screening.

### Materials & Methods

The cross sectional study was a urban health care based which carried out in Ardabil city in northwest of Iran. The present study was carried out among adult patients and accompanying persons who attended the UHC during 2014. Non-pregnant adult persons aged 30 years and above who attended the UHC were included in the study. Known hypertensive (having documented evidence or taking regular treatment) were excluded from the study. Using the formula  $4pq/d^2$ , taking  $p=25\%$  (proportion of people diagnosed to have hypertension in a previous screening program) (3), and 5% absolute precision, sample size was calculated to be 300. Adding a non-response rate of 20%, the final sample size was 360. Participants were selected with multistage sampling method.

Health students were trained in data collection procedures. They were supervised by the researchers. The study participants were interviewed using a pre-tested semi-structured interview schedule to collect data regarding socio-demographic variables such as age, gender and personal history of tobacco, Height, weight and waist circumference of the study participants were also measured. Blood pressure (BP) was measured for all participants. For the newly diagnosed cases of hypertension and diabetes during the study, were motivated to do so and necessary services were provided to them.

Height and weight were measured with SECA machine was used to measure the height and weight. Height was recorded to the nearest 0.1 cm and weight to the nearest 0.1 kg. The participants were weighed in minimal clothing without footwear. Waist circumference was measured using a non-stretchable measuring tape as the smallest horizontal girth between the costal margins and the iliac crests at minimal respiration.

Blood pressure was recorded using of mercury sphygmomanometer. The participants were seated quietly for at least 5 minutes in rest prior to BP measurement. Two BP readings were taken for each individual at an interval of 5 minutes and the average was considered as the final BP for that individual. For classification of systemic hypertension, the Joint National Committee 7 (JNC VII) criterion was used. Those who had Systolic Blood Pressure (SBP)  $\geq 140$  and or Diastolic Blood Pressure (DBP)  $\geq 90$  mmHg were diagnosed to have hypertension. SBP of 120-139 mm Hg and or DBP of 80-89 mm Hg were labelled as Pre-hypertensive. Normal blood pressure was taken as SBP  $< 120$  and DBP  $< 80$  mm Hg (9).

History of tobacco use in the last one month prior to the day of administration of the interview schedule and obesity was defined based on Body Mass Index (BMI) calculated from height and weight using the formula: weight (Kg)/height (m<sup>2</sup>). BMI was then classified using the new Asia Pacific guidelines for obesity i.e underweight ( $< 18.5$  kg/m<sup>2</sup>), normal (18.5-22.99 kg/m<sup>2</sup>), overweight (23-24.99 kg/m<sup>2</sup>) and obese ( $\geq 25$  kg/m<sup>2</sup>). Central obesity: It was defined as having a waist circumference  $\geq 90$  cm for men and  $\geq 80$  cm for women.

**Data analysis:** Data were entered in SPSS version 18 and was analyzed using chi-square test.

## Results

A total of 354 participants were finally screened for hypertension. Majority (55.1%) of the participants were females. Most of the study participants (31.6%) belonged to the age group of 40-49 years and majority of both males and female were in age 40-49 (Table 1).

**Table 1) demographic characteristics of the study participants screened for Hypertension (N=354)**

Age category in years	gender		Total
	No. of males (%)	No. of females (%)	
30-39	45 (28.3)	51 (26.2)	96(27.1%)
40-49	53 (33.3)	59 (30.2)	112(31.6%)
50-59	41 (25.8)	45 (23.1)	86(24.3%)
60-69	13 (8.2)	32 (16.4)	45(12.7%)
$\geq 70$	7 (4.4)	8 (4.1)	15(4.2%)
<b>Total</b>	159 (100.0)	195 (100.0)	354(100)

The results of BP screening showed that the distribution of newly diagnosed cases of hypertension, those having pre-hypertension and those having normal BP were 18.6% (66/354), 39.3 % (139/354) and 42.1% (149/354) respectively. Most of the normotensive, pre-hypertensive and hypertensive patients also belonged to the same age group (Table 2).

Majority of the study participants who were normotensive, pre-hypertensive or hypertensive's on screening were females. Near the one fifth of all participants were currently using tobacco and majority of the participants with current tobacco most of were hypertensive, whereas most of the normotensive and pre-hypertensive participants were not smoker and significant differences was found in blood pressure between current tobacco status, BMI and Waist circumference groups ( $P < 0.001$ ). Central obesity was present in 71.2% and 54.0% of hypertensive and pre-hypertensive participants respectively and 24.8

of normotensive participants had central obesity.

**Table 2) Distribution of age, gender and cardiovascular risk factors among normotensive, pre-hypertensive and hypertensive participants (N=354)**

Variable	Normotensive participants N (%), N=149	Pre-hypertensive participants (%), N=139	Hypertensive participants (%), N=66	Total (N=354)	P-Value	
Age	30-39	41 (27.5)	37 (26.6)	18 (27.3)	96 (27.1)	0.9
	40-49	47 (31.5)	44 (31.7)	21 (31.8)	112 (31.6)	
	50-59	37 (24.8)	34 (24.5)	15 (22.7)	86 (24.3)	
	60-69	19 (12.8)	17 (12.2)	9 (13.6)	45 (12.7)	
	≥ 70	5 (3.4)	7 (5.0)	3 (4.5)	15 (4.2)	
Gender	Male	64 (43.0)	63 (45.3)	32 (48.5)	159 (44.9)	0.74
	Female	85 (57.0)	76 (54.7)	34 (51.5)	195 (55.1)	
Current tobacco use	Yes	8 (5.4)	16 (11.5)	44 (66.7)	68 (19.2)	<0.001
	No	141 (94.6)	123 (88.5)	22 (33.3)	286 (80.8)	
BMI	Underweight	26 (17.4)	22 (15.8)	2 (3.0)	50 (14.1)	<0.001
	Normal	84 (56.4)	37 (26.6)	4 (6.1)	125 (35.3)	
	Overweight	17 (11.4)	28 (20.1)	19 (28.8)	64 (18.1)	
Waist circumference	Obese	22 (14.8)	52 (37.4)	41 (62.1)	115 (32.5)	<0.001
	Normal	112 (75.2)	64 (46.0)	19 (28.8)	195 (55.1)	
	Obese	37 (24.8)	75 (54.0)	47 (71.2)	159 (44.9)	

## Discussion

The rate of hypertension and pre-hypertension obtained through opportunistic screening in the present study was 18.6% and 39.3% respectively. This rate was only slightly lesser than the previous study in Iran. As per our knowledge, this is the only large scale study available in northwest of Iran till date giving an estimate of the yield of opportunistic screening for Hypertension. The prevalence of pre-hypertension reported in the same study was higher than the present study that this higher proportion might be because of the fact that the information was collected from general practitioners. Another reason could be the lower age cut-off used for including participants as compared to the present study.

A community-based survey done by Rao et al found the prevalence of pre-hypertension to be 38.7%, with 20.2% being newly detected cases of hypertension (10) These findings are very similar to our study. It also shows that facility based opportunistic screening could be a more cost-effective option as compared to community based surveys in terms of the yield concerned. A study done by Mahmood Syed Esam among 504 individuals found the prevalence of pre-hypertension and hypertension to be 27.2% and 27.4% respectively (11) and in another study, the prevalence of hypertension was 13.16% (present in 34 respondents) (12).

In some previous studies, increasing age i.e age greater than 40 years was found to be associated with hypertension (11,13) in our study a higher prevalence was seen in 40-49

years age group. This is again a key finding highlighting the importance of opportunistic screening so that the disease is picked up at an earlier stage. In our study Prevalence of hypertension was more common in women than men which is consistent with similar Iranian study (14) but two studies showed that the prevalence of hypertension is more among males as compared to females inconsistent to our study (10,15) and another study showed no gender difference (16).

The most recent reported prevalence of Total current and daily tobacco use among Iranian adults aged 15–64 was 14.8% (burden 7.3 million) and 13.7% (burden 6.7 million) when extrapolated to the Iranian population aged 15–64 (17) and in another study was 14.2% in 2005 (24.1% for men and 4.3% for women) according to WHO in the MPOWER package; the prevalence of daily tobacco smoking was 11.9% for the total population (20.9% for men and 2.9% for women) (18) however, Cigarette consumption is a stigma for women in Iranian culture. Thus there is probably some under-reporting about smoking by females. According to a study done in an urban area of Iran to compare self-reported and biochemically indicated rates of tobacco use there was a significant difference between the two measures among women (1.3% vs. 6.7%) (19). In our study, the proportion of tobacco users was higher among hypertensive participants as compared to those with normal blood pressure. This can be explained based on the fact that tobacco is more freely available for sale at a lower price in the present study area. Association of tobacco consumption with hypertension has been already reported in a couple of previous studies (20-22). In the present study, generalized obesity was present in 32.5% of the participants while 18.1% were overweight. In the study by

Bahrami (2006), the prevalence rates of overweight ( $BMI \geq 25 \text{ kg/m}^2$ ) and obesity ( $BMI \geq 30 \text{ kg/m}^2$ ) in this Iranian population were 62.2% and 28.0%, respectively (14).

In our study 62.1% hypertensive participants had generalized obesity. Among pre-hypertensive and normotensive participants, 37.4% and 14.8% had obesity and a significant association was seen between higher BMI and hypertension. This association has already been proved in many studies (10,11,13).

## Conclusion

Our study showed that the rate of undiagnosed hypertension and pre-hypertension in the study area of urban Ardabil was high. Most of the undiagnosed hypertension was detected in the 30-49 year age group, and in females. Facility-based opportunistic screening for cardiovascular risk factors looks to be a feasible option should be a regular practice in all PHCs in Ardabil. As a relatively larger number of adults were found to have pre-hypertension, there is a scope for early intervention. Cost-effectiveness studies are needed to compare facility-based versus community-based opportunistic screening for hypertension and other cardiovascular risk factors at the primary care level in Iran, before implementing such screening programmes on a wider scale.

One of the limitations of the present study was that we did not include all the socio-demographic variables like socio-economic status, marital status etc. One reason for doing so was that because we did this as a feasibility study, our main focus was to capture the yield obtained from opportunistic screening.

## Footnotes

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### Conflict of Interest:

The authors declared no conflict of interest.

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