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Prevalence, Awareness, Treatment, Control, and Determinants of Hypertension: A Population-Based Cross-Sectional Study in Southwest Iran

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Abstract

Background: Hypertension is the primary modifiable risk factor for cardiovascular disease. Our study aimed to assess the prevalence, awareness, treatment, and control of hypertension in southwest Iran.

Methods: This population-based cross-sectional study was conducted in the enrollment phase of Hoveyzeh cohort study in 10,009 adults aged 35–70 in southwest Iran between 2016 and 2018. Information on demographic characteristics socioeconomic status, Hypertension, comorbidities, family history of Hypertension was collected. Logistic regression was employed to identify the factors associated with hypertension, as well as awareness, treatment, and control.

Results: The overall prevalence of hypertension was 26.4% (95% confidence interval [CI]:25.5, 27.3). Among the population, 86.04% (95%CI: 84.7, 87.3) were aware of their condition, 81.18% (95%CI: 79.5, 82.8) were receiving treatment, and blood pressure was controlled in 70.15% (95%CI: 68, 72.2) of the treated hypertensive patients. In the adjusted model, older participants, those with low physical activity, individuals with a family history of hypertension, and patients with a history of diabetes or comorbidities of diabetes and dyslipidemia exhibited higher odds of having hypertension, as well as increased awareness. Additionally, being overweight or obese, married, and illiterate were associated with hypertension. Based on gender, women are more aware of their hypertension, receive more treatment, and have better control than men.

Conclusion: The prevalence of hypertension is relatively high; therefore, health promotion strategies, including lifestyle modifications to reduce overweight and obesity and to increase physical activity, are recommended.

Keywords: Prevalence, Awareness, Treatment, Control, Hypertension, Hoveyzeh Cohort Study

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Introduction

Hypertension (HTN) is a significant modifiable risk factor for cardiovascular disease and remains one of the leading causes of global morbidity and mortality. In 2024, an estimated 1.4 billion adults worldwide were living with hypertension, while only 23% had their condition under control. Despite its high prevalence, about 44% of affected individuals are unaware of their disease. In Iran, recent national estimates show a prevalence of 20.4%, with 49.3% awareness, 44.8% treatment, and only 37.4% control, indicating persistent gaps in hypertension management (1-3). Additionally, HTN plays a significant role in accelerating serious complications such as stroke, kidney failure, disability, and premature death (4). Over the past decade, the

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↑What is "already known" in this topic:
The prevalence of hypertension, awareness, treatment and control in different parts of the world and Iran has been investigated by other researchers. However, hypertension and related factors have not been studied in southwestern Iran according to this guideline.

→What this article adds:
This study identifies key demographic, behavioral, and clinical determinants associated with hypertension in southwest of Iran.

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prevalence of hypertension has risen due to an aging population and lifestyle changes, particularly in developing countries (5). Many individuals are unaware that they have hypertension (HTN) as it often lacks specific clinical symptoms. Consequently, they may not seek treatment or control for their condition, leading to delayed diagnosis within the community (6). Uncontrolled hypertension is linked to a higher risk of heart attack, stroke, heart failure, chronic kidney disease, and cognitive decline (7), as well as a heightened likelihood of cardiovascular mortality (8, 9).

Quantifying the unmet need for care and understanding the caregiving process at all stages is essential for effectively managing disease. For this reason, the cascade approach has been considered in the healthcare system for managing high blood pressure. However, some studies suggest that the prevalence of HTN, as well as awareness, treatment, and control, remains low in various countries (10-13). Recent research indicates that the prevalence, awareness, treatment, and control of HTN in Iran are 20.4%, 49.3%, 44.8%, and 37.4%, respectively (14). Another study on Iranian adults also revealed a high prevalence of HTN and increased levels of awareness. However, the treatment and control of HTN were primarily focused on individuals with higher socioeconomic status (SES) (15). Although national data exist, evidence from southwestern Iran remains limited. This region differs from other parts of the country in terms of ethnicity, lifestyle, dietary habits, and socioeconomic conditions, which may influence the burden and management of hypertension. Detailed information on prevalence, awareness, treatment, and control, along with contributing behavioral and metabolic risk factors, is still lacking for this population.

Currently, there is a lack of research on the prevalence, awareness, and treatment of hypertension in southwestern Iran. Given these gaps, region-specific data are essential for designing effective prevention and management strategies. Therefore, this study aims to evaluate the prevalence of hypertension and the levels of awareness, treatment, and control in the Hoveyzeh Cohort population. The findings will help inform policymakers and support targeted interventions to reduce the burden of hypertension in southwestern Iran.

Methods

Study Design and Population

This population-based cross-sectional study was conducted using the baseline data from the Hoveyzeh Cohort Study (HCS). HCS is part of the Prospective Epidemiological Studies of the Iranian Adult (PERSIAN), which investigates the prevalence, incidence, and risk factors of noncommunicable diseases in 10,009 Iranian adults aged 35 to 70 years from 2016 to 2018. Inclusion criteria for the study were the presence of hypertension information, an age range of 35 to 70 years, and willingness to participate. We excluded individuals with severe mental, psychological, or physical disabilities (16).

Blood pressure measurements

To measure blood pressure accurately, participants should refrain from exercising, consuming heavy meals, coffee, alcohol, drugs, stimulant drinks, or smoking for at least half an hour before the measurement. Before taking the first blood pressure measurement, participants should rest for 1-2 minutes. A Richter sphygmomanometer with the correct cuff size was used. The blood pressure cuff is neither loose nor tight on the bare arm. Blood pressure is measured twice on the person's right and left arms, with a ten-minute interval between measurements. During the blood pressure measurement, the person's arms are placed on a flat surface, such as a table.

Definition of prevalence, awareness, treatment and control of hypertension

In this study, the prevalence of hypertension is defined as having a systolic blood pressure above 140 mmHg or a diastolic blood pressure above 90 mmHg (17), using blood pressure-lowering medications, or having a self-reported diagnosis of hypertension. Hypertension awareness is defined as individuals' recognition of their condition. The treatment prevalence was calculated by dividing the number of subjects who reported taking medication with adequate blood pressure by all patients with hypertension. Blood pressure control was defined as having an average systolic and diastolic blood pressure of less than 140/90 mmHg. The control rate was defined as the proportion of subjects with adequate blood pressure control among those with hypertension.

Covariates

Age groups (35-45, 46-55, ≥65 years), gender (male, female), marital status (single, married, widowed, divorced), educational level (illiterate, primary school, middle school, high school, university), residential areas (urban, rural), smoking status (smoker, non-smoker). The wealth index was calculated according to the information on households' assets including freezer, vacuum cleaner, washing machine, motorbike, car, TV, cell phone, internet access, computer, and household utilities consisting of house ownership and the number of rooms per capita. A principal component analysis (PCA) was conducted to assign a coefficient to each asset. The sum of the first component scores constructed the wealth scores. Eventually, the scores were converted into quintiles based on the wealth index (poorest, poor, moderate, rich, richest (18), BMI (underweight, normal, overweight, obese), MET (Q1=low, Q2=medium, Q3=high), family history of HTN (no, yes), dyslipidemia (no, yes), and diabetes (no, yes).

Statistical analysis

Quantitative variables were described using the mean and standard deviation, and categorical variables were reported as numbers and percentages. The chi-square test evaluated the relationship between categorical variables. A univariate logistic model was fitted to assess the strength of the relationship between the investigated variables and blood pressure. Then, variables with a p-value < 0.25 were entered into the multiple models. Adjusted odds ratios were obtained from this model. All *P*-value of <0.05 was considered statistically significant. IBM® SPSS® Statistics 22.0 was used for the statistical analysis.

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Results

Among the 10,009 participants of the Hoveyzeh cohort study, the mean age was 48.76 ± 9.2 (ranging from 35 to 70), and 59.8% of them were female. Sixty-two percent were illiterate, and the most participants lived in urban areas (61.7%). Of the participants in this study, 39% were obese, approximately 20.9% had a history of smoking, and 52.7% reported a family history of hypertension (Table 1).

The mean systolic blood pressure of the population was 112.9 ± 18.24 mmHg, and the mean diastolic blood pressure was 71.4 ± 11.2 mmHg.

The overall prevalence of hypertension was 26.4% (95% CI: 25.5, 27.3). The highest prevalence, 46.3% (95% CI: 46.7, 47.9), was in the 55–70 age group. Hypertension prevalence increased with age, and it was higher in women compared to men (Figure 1). Single individuals had a lower prevalence of high blood pressure than those who were married, divorced, or widowed. The prevalence decreased with higher education levels, being highest in illiterate individuals at 30.8%. Urban residents had a higher prevalence of 28.5%, and the richest individuals had the highest prevalence at 28.3%. Obesity was linked to higher blood

Table 1. Basic characteristics of the study participants

Variables		N (%)
		10009 (100)
Age group (year)	35-44	3937 (39.3)
	45-54	3279 (32.8)
	>=55	2793 (27.9)
Sex	males	4026 (40.2)
	females	5983 (59.8)
Marital status	Single	343 (3.4)
	Married	8760 (87.5)
	Widow	737 (7.4)
	divorced	169 (1.7)
Educational level	Illiterate	6209 (62)
	Primary school	1665 (16.6)
	Middle school	673 (6.7)
	High school	741 (7.4)
	University	721 (7.2)
Residential areas	Urban	6176 (61.7)
	Rural	3833 (38.3)
Wealth Index	Poorest	2000 (20)
	Poor	2023 (20.3)
	Moderate	1982 (19.8)
	Rich	2023 (20.2)
	Richest	1971 (19.7)
BMI	Underweight	149 (1.5)
	Normal	2243 (22.4)
	Overweight	3712 (37.1)
	Obese	3905 (39)
Smoking	Smoker	2089 (20.9)
	No Smoker	7920 (79.1)
MET	Q1=low	33387 (33.3)
	Q2=medium	3351 (33.5)
	Q3=high	3320 (33.2)
Comorbidities	None	4645 (46.4)
	Diabetes	3138 (31.4)
	Dyslipidemia	1024 (10.2)
	Both	1202 (12.0)
Family history of Hypertension	No	4720 (47.2)
	Yes	5289 (52.8)

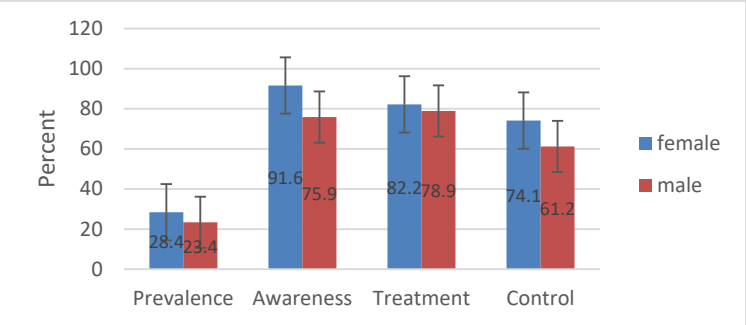

Figure 1. The prevalence, awareness, treatment, and control of hypertension by sex

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pressure, with obese individuals having a prevalence of 32.3%. A family history of hypertension increased prevalence to 31.9%, while higher physical activity levels led to lower prevalence. Among 2,643 participants with high blood pressure, 2,274 individuals (86.04%) (95% CI: 84.7, 87.3) were aware of their condition, with the highest awareness in the 55–70 age group. Awareness increased with age and was higher in women than in men. Treatment was received by 1,846 of the population (81.18%) (95% CI: 79.5, 82.8), especially among older individuals and women. Control of blood pressure was achieved by 70.15% (95% CI: 68, 72.2) of those treated, with better control seen in younger people, women, and those who live in urban areas (Table 2).

The findings showed the relationship between various demographic and health factors with the prevalence of HTN. Women had a higher crude odds of hypertension compared to men (OR = 1.3, 95% CI: 1.18–1.42), but after adjustment, the association was not significant (adjusted OR = 1.07, 95% CI: 0.94–1.22). Older age groups had significantly higher odds, with individuals aged 55 and above having the highest adjusted risk (adjusted OR = 6.58, 95% CI: 5.68–7.61). Married and widowed/divorced individuals had a higher prevalence of hypertension than singles, with adjusted ORs of 1.46 (95% CI: 1.05–2.04) and 1.51 (95% CI: 1.06–2.17), respectively. Lower education levels, particularly illiteracy (adjusted OR = 1.62, 95% CI: 1.27–2.06), were associated with increased prevalence of hypertension. Urban residence was linked to higher crude odds (OR = 1.33, 95% CI: 1.21–1.46), though the adjusted OR was slightly lower (1.18, 95% CI: 1.01–1.36). Smoking did not show a significant adjusted association (OR = 1.01, 95% CI: 0.88–1.15). Wealth index had no significant trend in association. Higher physical activity levels were protective, with those in the highest category (Q3) having a significantly lower adjusted OR (0.69, 95% CI: 0.61–0.78). Overweight and obesity were associated with significantly higher odds (adjusted OR = 1.47 and 2.20, respectively). Having a family history of hypertension was strongly associated with the prevalence of hypertension (adjusted OR = 2.27, 95% CI: 2.04–2.52). Among comorbidities, diabetes (adjusted OR = 2.11, 95% CI: 1.81–2.47) and having both diabetes and dyslipidemia (adjusted OR = 2.16, 95% CI: 1.86–2.50) were significantly associated (Table 3).

The results of logistic regression analysis examining factors associated with hypertension awareness. Women had significantly higher odds of being aware of their hypertension status compared to men (adjusted OR = 3.98, 95% CI:

Table 2. Prevalence, Awareness, Treatment, and Control by Demographic and Clinical Characteristics of Participants.

Variables		Prevalence% (95% CI)	Awareness% (95% CI)	Treatment% (95% CI)	Controlled% (95% CI)
Total		n=2643	n=2274	n=1846	n=1295
		26.4 (25.5-27.3)	86.04 (84.7-87.3)	81.18 (79.5-82.8)	70.15 (68.0-72.2)
Age group (year)	35-44	11.4 (10.6-12.3)	75.9 (71.7-79.8)	67.4 (62.2-72.4)	74.3 (68.2-79.9)
	45-54	27.5 (26.0-29.0)	85.0 (82.5-87.3)	79.8 (76.7-82.6)	70.4 (66.6-74.0)
	>=55	46.3 (44.7-47.9)	90.3 (88.5-91.8)	86.1 (84-88.1)	69.1 (66.1-71.9)
Sex	males	23.4 (22.1-24.8)	75.9 (73.1-78.2)	78.9 (75.7-81.8)	61.2 (57.1-65.3)
	females	28.4 (27.3-29.6)	91.6 (90.2-92.9)	82.2 (80.2-84.1)	74.1 (71.6-76.5)
Marital status	Single	14.6 (11.0-18.8)	82.0 (68.6-91.4)	80.5 (65.1-91.2)	81.8 (64.5-93.0)
	Married	25.4 (24.5-26.4)	84.8 (83.3-86.3)	80.5 (78.7-82.3)	69.3 (66.9-71.6)
	Widow	43.8 (40.2-47.5)	94.1 (91.0-96.4)	86.5 (82.2-90.1)	74.9 (69.2-80.0)
	divorced	24.9 (18.5-32.1)	92.9 (80.5-98.5)	71.8 (55.1-85.0)	60.7 (40.6-78.5)
Educational level	Illiterate	30.8 (29.6-32.0)	88.1 (86.5-89.5)	82.4 (80.5-84.2)	70.4 (67.9-72.8)
	Primary school	19.9 (18.0-21.9)	82.8 (78.3-86.7)	79.9 (74.7-84.5)	73.5 (67.1-79.2)
	Middle school	20.2 (17.2-23.4)	76.5 (68.4-83.3)	78.8 (69.7-86.2)	67.1 (55.8-77.1)
	High school	18.4 (15.6-21.3)	79.4 (72.0-85.6)	75.0 (65.7-82.5)	66.7 (55.3-76.8)
	University	17.8 (15.0-20.7)	81.3 (73.4-87.6)	73.1 (63.5-81.3)	63.2 (51.3-79.3)
Residential areas	Urban	28.5 (27.3-29.6)	86.6 (84.6-88.1)	81.5 (79.4-83.4)	72.2 (69.6-74.7)
	Rural	23.1 (21.8-24.5)	85.0 (82.4-87.3)	80.6 (77.6-83.4)	66.0 (62.1-69.8)
Wealth Index	Poorest	26.8 (24.9-28.8)	86.6 (83.4-89.3)	80.8 (76.9-84.3)	67.5 (62.5-72.5)
	Poor	25.1 (23.3-27.1)	84.9 (19.6-23.2)	83.6 (79.8-87.0)	69.7 (64.7-74.4)
	Moderate	25.8 (23.9-27.8)	84.9 (19.6-23.2)	80.2 (76.01-83.8)	72.7 (67.7-77.3)
	Rich	26.1 (24.2-28.1)	86.7 (83.5-89.5)	79.7 (75.7-83.3)	72.3 (67.4-76.9)
	Richest	28.3 (26.3-30.3)	86.9 (83.8-89.6)	81.6 (77.9-85.0)	68.9 (64.0-73.4)
BMI	Underweight	18.8 (13.1-25.7)	78.8 (59.0-91.7)	68.2 (46.9-84.9)	66.7 (38.4-88.2)
	Normal	18.9 (17.3-20.6)	87.3 (83.7-90.3)	81.1 (76.7-84.9)	67.3 (61.7-72.1)
	Overweight	25.0 (23.6-26.5)	85.7 (83.3-87.9)	80.8 (77.9-83.5)	75.0 (62.6-85.0)
	Obese	32.3 (30.9-33.8)	86.1 (84.0-87.9)	81.8 (79.3-84.0)	70.0 (67.8-72.1)
Smoking	Smoker	28.4 (26.5-30.4)	82.5 (79.3-25.3)	82.7 (79.0-85.5)	66.4 (61.6-71.0)
	No Smoker	25.9 (24.9-26.9)	87.1 (85.5-88.5)	80.8 (78.9-82.6)	71.2 (68.8-73.5)
MET	Q1=low	34.8 (33.1-36.4)	89.1 (87.2-90.8)	84.0 (81.6-86.1)	70.3 (67.1-73.3)
	Q2=medium	24.7 (23.2-26.6)	86.2 (83.7-88.5)	78.3 (75.0-81.2)	71.0 (67.0-74.4)
	Q3=high	19.5 (18.2-20.9)	80.2 (77.0-83.2)	79.6 (75.9-83.0)	68.8 (64.1-73.3)
Comorbidities	None	20.2 (19.1-21.4)	84.9 (82.4-86.8)	79.9 (77.0-82.7)	69.1 (65.4-72.7)
	Diabetes	22.7 (21.2-24.2)	80.8 (77.7-83.6)	78.8 (75.2-82.1)	71.5 (67.1-75.6)
	Dyslipidemia	44.7 (41.7-47.8)	93.0 (90.3-95.2)	83.3 (79.4-86.7)	73.5 (68.6-78.0)
	Both	44.3 (41.5-47.2)	89.1 (86.2-91.6)	84.2 (80.6-87.4)	67.2 (61.0-73.1)
Family history of Hypertension	No	21.4 (20.2-22.6)	84.1 (81.7-86.3)	79.5 (76.6-82.2)	69.4 (65.8-72.9)
	Yes	31.9 (30.5-33.2)	87.2 (85.5-88.8)	82.6 (80.4-84.6)	70.6 (67.4-72.9)

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Table 3. Crude and adjusted odds ratios and their 95% confidence intervals of factors associated with the prevalence, awareness, treatment, and control of hypertension in the HCS population using univariate and multiple logistic models

Variables		Prevalence		Awareness among hypertensive patients		Treatment among aware patients		Control among treated patients	
		Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95%CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Sex	Male	1	1	1	1	1	1	1	1
	Female	1.3 (1.18,1.42)	1.07 (0.94,1.22)	3.47 (2.77,4.37)	3.98 (2.97,5.34)	1.24 (0.99,1.54)	1.34 (1.02,1.76)	1.81 (1.47,2.23)	1.84(1.45,2.34)
Age	35-44	1	1	1	1	1	1	1	
	45-54	2.94 (2.59,3.33)	2.69 (2.36,3.08)	1.79 (1.35,2.39)	1.73 (1.28,2.35)	1.90 (1.43,2.53)	1.89 (1.40,2.54)	0.85 (0.62,1.16)	
	≥55	6.69 (5.92,7.58)	6.58 (5.68,7.61)	2.93 (2.21,3.89)	2.86 (2.05,3.99)	2.99 (2.26,3.97)	3.12 (2.27,4.30)	0.86 (0.64,1.16)	
Marital status	Single	1	1	1	1	1	1	1	1
	Married	1.99 (1.47,2.71)	1.46 (1.05,2.04)	1.22 (0.59,2.55)	1.76 (0.81,3.83)	1.00 (0.46,2.19)	1.02 (0.46,2.26)	0.50 (0.21,1.22)	0.61 (0.25,1.49)
	Widow/ di-vorced/other	3.95 (2.85,5.49)	1.51 (1.06,2.17)	3.42 (1.48,7.93)	2.02 (0.83,4.88)	1.36 (0.59,3.10)	0.94 (0.40,2.19)	0.62 (0.25,1.55)	0.61 (0.24,1.54)
Education	illiterate	2.06 (1.69,2.51)	1.62 (1.27,2.06)	1.71 (1.07,2.71)	1.09 (0.77,1.53)	1.73 (1.10,2.71)	1.10 (0.68,1.83)	1.39 (0.86,2.24)	
	Primary school	1.15 (0.92,1.4)	1.18 (0.91,1.52)	1.11 (0.65,1.88)	0.99 (0.63,1.58)	1.47 (0.87,2.48)	1.26 (0.73,2.19)	1.62 (0.93,2.82)	
	Middle school	1.73 (0.89,1.53)	1.37 (1.02,1.84)	0.75 (0.41,1.36)	1.18 (0.73,1.91)	1.37 (0.72,2.60)	1.28 (0.66,2.46)	1.19 (0.62,2.29)	
	High school	1.04 (0.79,1.36)	1.04 (0.78,1.32)	0.89 (0.49,1.64)	1.48 (0.88,2.48)	1.10 (0.59,2.04)	0.93 (0.49,1.74)	1.17 (0.61,2.24)	
	University	1	1	1	1	1		1	
Residence	Rural	1	1	1		1		1	1
	Urban	1.33 (1.21,1.46)	1.18 (1.21,1.46)	1.14 (0.91,1.44)		1.06 (0.85,1.32)		1.34 (1.08,1.65)	1.36 (1.09,1.68)
Smoking	Nonsmoker	1	1	1	1	1		1	1
	Smoker	1.14 (1.02,1.27)	1.01 (0.88,1.15)	0.70 (0.55,0.89)	1.15 (0.86,1.53)	1.13 (0.87,1.47)		0.80 (0.63,1.01)	1.07 (0.83,1.39)
Wealth Index	Poorest	1	1	1		1		1	
	Poor	0.92 (0.79,1.06)	0.93 (0.79,1.09)	0.88 (0.62,1.24)		1.21 (0.86,1.71)		1.11 (0.81,1.51)	
	Moderate	0.95 (0.82,1.09)	1.03 (0.87,1.21)	0.88 (0.62,1.24)		0.96 (0.69,1.34)		1.28 (0.93,1.77)	
	Rich	0.97 (0.84,1.11)	1.0 (0.85,1.18)	1.02 (0.71,1.45)		0.93 (0.67,1.29)		1.26 (0.92,1.73)	
	Richest	1.08 (0.94,1.24)	1.09 (0.92,1.29)	1.03 (0.73,1.46)		1.05 (0.76,1.45)		1.07 (0.79,1.44)	

2.97–5.34). Older age groups, particularly those aged 55 and above, were more likely to be aware of their condition compared to younger individuals. Education level did not show a strong association with awareness after adjustment. Urban residence was not significantly linked to awareness. Smoking status had no effect after adjustment. Individuals with higher physical activity levels were less likely to be aware of their hypertension. A family history of hypertension was significantly associated with greater awareness (adjusted OR = 1.46, 95% CI: 1.14–1.56). Among comorbidities, diabetes was strongly linked to increased awareness, while dyslipidemia was not significant after adjustment (Table 3).

Additionally, Table 3 demonstrates logistic regression results for factors related with receiving hypertension treatment among aware patients. Women were more likely to receive treatment than men (adjusted OR = 1.34, 95% CI: 1.02–1.76). Older age was significantly associated with higher odds of treatment, with individuals aged 55 and above being the most likely to receive treatment (adjusted OR = 3.12, 95% CI: 2.27–4.30). Marital status, education level, residence, and smoking status were not significantly associated with treatment. Wealth index showed no clear trend, and physical activity levels were not significantly related to treatment after adjustment. Having a family history

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Table 3. Crude and adjusted odds ratios and their 95% confidence intervals of factors associated with the prevalence, awareness, treatment, and control of hypertension in the HCS population using univariate and multiple logistic models

Variables		Prevalence		Awareness among hypertensive patients		Treatment among aware patients		Control among treated patients	
		Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95%CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Physical activity	Q1=low	1	1	1	1	1	1	1	
	Q2=medium	0.61 (0.55,0.68)	0.82 (0.73,0.93)	0.76 (0.58,0.99)	0.70 (0.52,0.94)	0.69 (0.54,0.88)	0.79 (0.61,1.02)	1.04 (0.82,1.31)	
	Q3=high	0.45 (0.40,0.50)	0.69 (0.61,0.78)	0.49 (0.38,0.65)	0.64 (0.48,0.57)	0.75 (0.57,0.98)	0.96 (0.72,1.28)	0.94 (0.73,1.21)	
BMI	Normal	1	1	1		1		1	
	Underweight	0.99 (0.65,1.52)	0.95 (0.60,1.49)	0.54 (0.21,1.38)		0.50 (0.20,1.27)		0.97 (0.32,2.92	
	Overweight	1.43 (1.26,1.63)	1.47 (1.27,1.69)	0.87 (0.62,1.23)		0.98 (0.72,1.34)		1.12 (0.84,1.51)	
	Obese	2.05 (1.81,2.32)	2.20 (1.91,2.54)	0.90 (0.65,1.25)		0.77 (1.70,1,2.2)		1.21 (0.91,1.61)	
Family history of hypertension	No	1	1	1	1	1	1	1	
	Yes	1.65 (1.51,1.80)	2.27 (2.04,2.52)	1.29 (1.03,1.61)	1.46 (1.14,1.56)	1.19 (0.96,1.48)	1.46 (1.17,1.84)	1.06(0.86,1.29)	
Comorbidities	No	1	1	1	1	1	1	1	
	Dyslipidemia	1.16 (1.04,1.29)	1.11 (0.98,1.25)	0.75 (0.58,0.97)	0.832 (0.63,1.09)	0.93 (0.72,1.21)	0.95 (0.77,1.24)	1.12 (0.86,1.46)	
	Diabetes	3.19 (2.77,3.68)	2.11 (1.81,2.47)	2.37 (1.59,3.54)	2.06 (1.36,3.12)	1.25 (0.92,1.71)	1.08 (0.79,1.48)	1.24 (0.93,1.66)	
	Both	3.14 (2.75,3.59)	2.16 (1.86,2.50)	1.46 (1.05,2.02)	1.46 (1.03,2.05)	1.34 (0.99,1.80)	1.16 (0.85,1.58)	0.92 (0.70,1.20)	

of hypertension increased the likelihood of treatment (adjusted OR = 1.46, 95% CI: 1.17–1.84), while comorbidities such as diabetes and dyslipidemia were not significantly linked to treatment in the adjusted model.

The results showed factors associated with blood pressure control among treated hypertension patients using logistic regression. Women had significantly higher odds of achieving blood pressure control compared to men (adjusted OR = 1.84, 95% CI: 1.45–2.34). Older age was negatively associated with control, with individuals aged 55 and above being the least likely to have controlled blood pressure. Urban residents had significantly higher odds of control compared to rural residents (adjusted OR = 1.36, 95% CI: 1.09–1.68). Other factors, including marital status, education level, smoking status, wealth index, physical activity, BMI, family history of hypertension, and comorbidities, were not significantly associated with blood pressure control in the adjusted model (Table 3).

Discussion

Our findings indicated that 26.4% of the adult population in the Hoveyzeh cohort had hypertension, with the highest percentage in the 55–70 age group. Among those diagnosed with hypertension, 86.04% were aware of their status, and 81.18% of those participants were receiving treatment. Furthermore, blood pressure was effectively controlled in 70.15% of the patients undergoing treatment.

Previous studies in Iran have reported wide variation in the prevalence of hypertension, ranging from 4.5% to 46.9% (18). The prevalence observed in our study falls within this reported range and is consistent with findings from the Ravansar Non-Communicable Disease (RaNCD) Cohort Study (19). However, our prevalence is higher than that reported in a recent meta-analysis, which estimated national prevalence, awareness, treatment, and control rates at 20.4%, 49.3%, 44.8%, and 37.4%, respectively (14). Eghbali et al. reported the overall prevalence of hypertension to be 17.3%, with overall awareness at 69.2%, overall treatment at 92.4%, and overall control at 59.9% (20). The variations in hypertension prevalence across different regions of Iran can be explained by differences in age demographics, education levels, cultural factors, economic status, geographic location, lifestyle choices, and dietary habits The high prevalence of risk factors, such as low physical activity and obesity, particularly among women, in addition to the advanced age of the research subjects, contributes to the elevated incidence of high HTN observed in this study.

Our data suggest that women had a higher crude prevalence of hypertension compared to men; however, this association was not significant after adjustment for confounders. Nevertheless, awareness, treatment, and control rates were consistently higher among women, which aligns with previous Iranian studies (19, 21). Higher obesity rates among women in our cohort (46.8% vs. 27.4%) and the lower prevalence of physical activity documented in women in similar studies may contribute to this difference.

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Additionally, previous research indicates that women tend to utilize healthcare services more frequently and adhere more consistently to treatment, which may explain their higher levels of awareness and medication use.

In the present study, the prevalence, awareness, and treatment increase with age. As individuals age, the walls of the aorta and arteries become increasingly rigid, which contributes to the elevated incidence of hypertension among older populations (22). Additionally, before adjustment, illiterate individuals exhibit a higher prevalence, awareness, and treatment of HTN compared to those with a university education. After adjustment, however, no relationship was found between treatment, awareness, and education, which aligns with findings from the previous study (23).

We also found that living in urban areas was positively associated with hypertension prevalence and control. This is consistent with other studies reporting that urban residents may have lifestyle patterns—such as lower physical activity and higher consumption of processed foods—that increase hypertension risk (24, 25). Additionally, better access to healthcare services in urban areas may contribute to improved detection and management.

Our results indicate that individuals with a high BMI have a higher prevalence of HTN. Furthermore, we found that awareness, treatment, and control of HTN were not associated with BMI after adjustment. Similar to the study in Kerman and Varanasi, individuals with a family history of hypertension had a higher prevalence of HTN, as well as greater awareness and treatment. The high prevalence of blood pressure in these individuals could be due to similar genetics and lifestyle. Considering the aforementioned cases, it seems that these individuals can assess themselves regarding the risk of developing HTN and early diagnosis (26, 27).

Participants with diabetes and dyslipidemia were more likely to have hypertension and to be aware of their situation, consistent with findings from Eghbali et al. (20). Individuals with comorbidities typically interact more frequently with the healthcare system, which may contribute to higher detection and monitoring rates.

Finally, we observed no significant association between smoking, wealth index, and hypertension prevalence, awareness, treatment, or control before or after adjustment.

Limitations and Strengths of the Study

This research benefits from a large sample size and comprehensive data on demographic, clinical, and lifestyle-related determinants of hypertension. The use of standardized measurement protocols and trained personnel enhances the reliability of the findings.

However, several limitations should be acknowledged. First, the analysis was based on a cross-sectional design, which precludes causal inference. Second, only one guideline was used to categorize blood pressure; future research may benefit from comparing different diagnostic thresholds. Third, the cohort includes only adults aged 35 years and older; therefore, the findings may not be generalizable to younger populations. Fourth, certain potentially important confounding variables, such as medication adherence, genetic predisposition, and psychosocial stress, were not measured in this study and may have influenced the observed associations.

Conclusion

Hypertension is highly prevalent among adults in southwestern Iran, although awareness, treatment, and control rates are comparatively high. Despite this, a proportion of individuals with hypertension remains undiagnosed. Strengthening public health strategies, including targeted awareness campaigns, community-based screening programs, and initiatives to improve health literacy, may help identify high-risk groups and improve hypertension management. These findings can inform regional policymakers in designing culturally appropriate interventions aimed at reducing the burden of hypertension and its associated complications.

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Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contributions

Design and conceptualization: N.S., B.CH. Data curation: S.J.H., S.A.H. Formal analysis: M.R. Investigation: all authors. Methodology: M.R., B.CH. Project administration: N.S. Supervision: N.S., S.J.H. Validation: B.CH., M.A. Writing original draft: M.R., Z.R. Review and editing: all authors.

Ethical Considerations

This project was approved by the ethics committee of Ahvaz Jundishapur University of Medical Sciences (Ethical code: IR.AJUMS.REC.1400.622). This study was conducted following the principles of the Helsinki Declaration, and informed consent was obtained from all participants.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

AI Use Statement

The authors confirm that artificial intelligence tools were utilized solely for the purpose of language editing. Consequently, the authors assume complete responsibility for the accuracy and integrity of this work.

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