Original Research

Investigating the Prevalence of High Blood Pressure in People Under 35 Years of Age in Patients Referred to Emergency Ward of Hospitals in Jahrom City: A Cross-Sectional-Analytical Study

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Abstract

Background: Hypertension is the first risk factor for death worldwide and is one of the most important chronic diseases in developed and developing countries. The high prevalence of high blood pressure worldwide, on the one hand, and its serious and dangerous complications on body organs, on the other hand, have made this disease a major health problem in all societies. This study was conducted to investigate the prevalence of high blood pressure in people aged 18 to 35 years in patients referred to hospitals in Jahrom city in 2023.

Method: The study was a cross-sectional-analytical study that was conducted on 160 patients aged 18 to 35 years who referred to hospitals of Jahrom University of Medical Sciences. Demographic information was collected by a questionnaire, and then the blood pressure of the individuals was measured using a standard method, and those who had high blood pressure had their blood pressure measured again two weeks later. Data analysis was performed using SPSS version 21 software and descriptive statistics and inferential statistical tests at a significance level of $P<0.05$.

Results: The results of the study showed that 34 percent (55 people) of patients had uncontrolled blood pressure with medication, 12 percent (19 people) had controlled blood pressure with medication, and 54 percent (86 people) of patients had hypertension without medication. The result of the chi-square test showed that there was a significant difference between the study groups in terms of occupation ($p=0.032$). Also, when comparing the three groups of patients in terms of demographic information, physical activity, sleep duration, and nutrition, no significant relationship was observed.

Conclusion: The prevalence of hypertension in urban society is high, and the rate and treatment are low. Therefore, the intervention of health centers is necessary for education, prevention, lifestyle changes, and monitoring of people from a young age.

Keywords: Blood Pressure, Jahrom, Hypertension.

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Introduction

Hypertension is the leading risk factor for mortality globally and is a major chronic disease affecting both developed and developing countries (1). Characterized by chronic systolic blood pressure above 140 mmHg and diastolic blood pressure above 90 mmHg (2), hypertension poses a significant health concern due to its high prevalence and severe complications on body organs (3). Approximately 60 million people in the United States and over 1 billion people worldwide suffer from hypertension, with an estimated 1.5 billion people expected to be affected by 2025 (4). In the United States, 31% of adults over 18 years old have hypertension (5), while in our country, the prevalence has increased to 23.3% (6), with regional variations ranging from 11% in large cities to 38% in Tehran (7). If left undiagnosed and untreated, 50% of patients with hypertension will die from coronary artery disease or heart failure, 33% from stroke, and 10-15% from kidney failure (6). Established risk factors for hypertension include obesity (8), high cholesterol levels, low physical activity, and a positive history of heart and kidney diseases, and diabetes (9-10). Other risk factors include race, male gender, smoking, increasing age, and hereditary background (11-12). Although awareness, treatment, and control of hypertension have improved in adults (13-16), young adults remain a vulnerable group, with worse awareness, treatment, and control compared to middle-aged and older adults (13-15, 17). Unfortunately, previous studies have focused primarily on the general population over 35 years old, leaving a knowledge gap on hypertension in young adults (18-19). Given the increasing global incidence of hypertension, it is likely that its prevalence among young people is also rising, making the age range of 18-35 years crucial for prevention and early treatment of hypertension and potential reduction of short-term and long-term cardiovascular disease risk (20-21). However, young people are often not screened for blood pressure. Therefore, this study aims to investigate the frequency of high blood pressure in individuals aged 18 to 35 years who visited hospitals in Jahrom city in 2020.

Method

This cross-sectional analytical study was conducted among patients aged 18 to 35 years who visited teaching hospitals in Jahrom city in 2020. The sampling method employed was a two-stage stratified sampling, with the first stage involving the selection of hospitals and the second stage involving non-probability convenience sampling. Informed consent was obtained from all participants, and their information was kept confidential with their permission. The study did not impose any financial costs on the patients, and medical ethics considerations were adhered to.

The inclusion criteria for the study were patients aged 18 to 35 years who visited teaching hospitals of Jahrom University of Medical Sciences. The exclusion criteria included bilateral arterial stenosis, pregnancy, use of lipid-lowering medications in the past year, high lipids at the beginning of the study, heart, kidney, and liver diseases, and lack of consent and cooperation to participate in the study.

Data collection involved a demographic information questionnaire and factors related to blood pressure. Demographic characteristics included age, gender, marital status, level of education, and occupation, while factors related to blood pressure included family history of high blood pressure, smoking, tea consumption, and others. Physical indicators related to blood pressure were measured through interview and examination, including height, weight, waist and hip circumference. Body mass index (BMI) was calculated, and waist-hip ratio (WHR) was measured to assess abdominal obesity.

Blood pressure was measured in the sitting position using a mercury sphygmomanometer and a stethoscope, following standard guidelines. The average of two blood pressure measurements was considered as the subject's blood pressure. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) criteria were used to define hypertension, with a systolic blood pressure of 140 mmHg or a diastolic blood pressure of 90 mmHg or the use of antihypertensive medication in the past month indicating high blood pressure. The severity of blood pressure

was classified into four grades: normal blood pressure, pre-hypertension, stage I hypertension, and stage II hypertension. Awareness of blood pressure was defined as a positive answer to the question of whether the participant had ever been treated by a doctor for high blood pressure, while treatment and control of blood pressure were defined as the use of blood pressure-lowering drugs and a systolic blood pressure less than 140 mmHg and diastolic pressure less than 90 mmHg, respectively.

Therefore, individuals with an average systolic blood pressure exceeding 140 mmHg or diastolic blood pressure exceeding 90 mmHg, or those who had taken antihypertensive medications during the past month, were considered as individuals with high blood pressure. Laboratory evaluations were performed to identify potential secondary causes of hypertension. These tests included complete blood count, cholesterol, triglycerides, blood sugar, urea, creatinine, sodium, potassium, uric acid, complete urinalysis, and chest electrocardiography.

After collecting the data, statistical analysis was performed using SPSS version 21 computer software. Statistical tables (percentage, number, mean, and standard deviation) were used to describe the results. Pearson Correlation, Independent Sample Test, and Chi-Square tests were used to analyze the relationships between variables. The significance level was considered to be $P<0.05$.

Results

Total number of 160 patients referred to medical centers in Jahrom city in 2020 were included in the study based on the inclusion criteria. 88 (0.55%) of them were female and the rest were male. Based on the inclusion criteria, 34% (55) of the patients had uncontrolled blood pressure with medication, 12% (19) had controlled blood pressure with medication, and 54% (86) had hypertension without medication. The result of the chi-square test showed that there was a significant difference between the study groups in terms of occupation ($p=0.032$). In the groups of patients with uncontrolled blood pressure and patients with controlled blood pressure, government jobs were the most common, but patients with hypertension without medication were mostly housewives or unemployed. The results of the chi-score test also showed that in the groups of patients with uncontrolled blood pressure and patients with controlled blood pressure, family history of blood pressure was higher than in the third group ($p=0.001$). The majority of patients in the study groups had an income of over two million and their place of residence was in the city. Also, in the groups of patients with uncontrolled blood pressure and patients with controlled blood pressure, bachelor's degree was the most frequent, but the results of the chi-score test between the groups of patients with uncontrolled blood pressure, patients with controlled blood pressure, and patients with blood pressure without taking medication were not significant in terms of other demographic information ($p<0.05$) (Table 1).

The amount of physical activity and exercise per week in patients in the blood pressure groups with and without control (34.5%) and blood pressure group with and under control (15.8%) was lower than the group of patients with and without blood pressure (44.2%). Also, the amount of sleep of 5-7 hours per day was the most frequent in the studied groups; however, the result of the chi-square test showed that there was no significant difference between the groups of patients with and without control of blood pressure, patients with and under control of blood pressure, and patients with and without blood pressure in terms of the amount of physical activity and exercise per week and the amount of sleep per day ($p<0.05$) (Table 2).

The weekly consumption of fatty and high-calorie foods in the blood pressure groups with and without control (40%) was higher than in the blood pressure group with and without control (26.3%), but both were significantly lower than in the blood pressure group without control ($p=0.042$). The results showed that the weekly consumption of fast food in the blood pressure groups with and without control (67.3%) was higher than in the blood pressure group with and without control (31.6%), but the weekly consumption of fast food in the blood pressure group without control was significantly lower than in both groups ($p=0.026$). The majority of patients in the study groups had a history of daily coffee consumption; However, the result of the chi-

score test showed that there was no significant difference between the groups of patients with hypertension on medication and uncontrolled, patients with hypertension on medication and under control, and the group of patients with hypertension and without medication in terms of smoking, alcohol, and diet history ($p<0.05$) (Table 3).

To predict the frequency of high blood pressure in patients aged 18 to 35 years referring to medical centers in Jahrom city, logistic regression was used using the inter-multivariate method. The study groups were considered as the dependent variable and the reference group was the control group. Gender, occupation, education, family history of blood pressure, amount of physical activity and exercise per week, history of alcohol consumption, consumption of fast food during the week, consumption of energy-producing compounds during the week, and amount of sleep per day were entered into the model as predictors. The results showed that among the variables entered into the model, in the blood pressure group with medication and without control, people with a cycle, diploma, and bachelor's degree education had a greater chance of controlling blood pressure with medication. People without physical activity and exercise per week had a lower chance of controlling blood pressure with medication. Also, in the blood pressure group with medication and under control, housewives or unemployed and self-employed patients had a greater chance of controlling blood pressure with medication (Table 4).

Discussion

Hypertension is the leading risk factor for mortality globally and is a major chronic disease affecting both developed and developing countries. The high prevalence of hypertension worldwide, combined with its severe complications on body organs, has made it a significant health concern in all societies (22). It is estimated that by 2025, approximately 1.5 billion people worldwide will be affected by this disease (23). Given the limited information on blood pressure in young people, as previous studies have primarily focused on the general population, especially those over 35 years of age, this study aimed to investigate the frequency of high blood pressure in individuals aged 18 to 35 years who visited hospitals in Jahrom city in 2020.

This study included 160 patients who visited hospitals in Jahrom city in 2020. The results showed that 34% of patients had uncontrolled hypertension despite medication, 12% had controlled hypertension with medication, and 54% had hypertension without medication. These findings are consistent with a study by Kalani et al., who examined the status of hypertension in individuals over 18 years of age in Yazd, which reported that approximately three-quarters of patients who were aware of their disease received medication and were under treatment, but only 12.4% had controlled blood pressure (23). A significant gap in treatment and success rates is also observed in other societies. For example, a Greek study found that although 83.9% of patients were treated, only 15.2% had their disease under control (24). The difference in treatment effectiveness and success rates may be attributed to the lack of appropriate and sufficient prescribed medications or poor patient compliance with antihypertensive medications. Studies have shown that only 50-60% of patients take their prescribed medications correctly (24). The JNC-7 report emphasizes that high blood pressure will only be controlled if patients are sufficiently motivated to continue treatment, and factors such as positive experiences, trust in the treating physician, and empathy can increase patient motivation and satisfaction (25). Statistical tests in this study revealed no significant relationship between gender and the prevalence of hypertension, consistent with the findings of Mojahedi et al. in Mashhad (26), Mohammadi et al. in Torbat Heydariyeh (27), and a study in South America (28).

This is while in the study by Yousefzadeh et al. in Birjand, which investigated high blood pressure in health workers under 40 years of age, the prevalence of hypertension was higher in men than in women (29). Also, in the United States of America, the prevalence of hypertension in men under 41 years of age was reported to be twice as high as in women (30). In this regard, it can be said that this is probably due to the insufficient sample size and the low number of positive cases of hypertension. The results showed a decrease in the prevalence of

hypertension in rural communities compared to urban communities, which confirms the results of most studies conducted (27, 31-32). The reasons for this could be the healthier lifestyle of rural residents (more physical activity and healthier food consumption) compared to urban residents (more stressful and sedentary lifestyle, more consumption of prepared and unhealthy foods) (33). Consistent with the results of this study, in the study by Mohammadi et al., the reduction in hypertension was significantly associated with greater physical activity, income, and higher education. Greater physical activity leads to a decrease in body mass (34). Increased body mass is one of the known risk factors for hypertension. On the other hand, educated individuals, due to their general knowledge about diseases, ability to read brochures, books, and articles, and their understanding, are likely to have better and greater awareness and ability to maintain their health and quality of life compared to illiterate or poorly educated individuals, which could be one of the reasons for the lower prevalence of hypertension in these individuals (31). Alcohol consumption in this study did not show a significant association with hypertension in young people, which was consistent with the results of the study by Mohammadi et al. This is while two studies conducted in the United States (28, 30) and one study in Brazil (35) as well as the results of Mojadi et al. in Iran showed a significant relationship between alcohol consumption and hypertension (26). The results of this study further showed that there was no statistically significant relationship between diet and hypertension, which is consistent with the results of the study by Marathi et al. and the study by Mohammadi et al. Although in most articles, high salt consumption is recognized as a potential factor in the occurrence of hypertension (36). Of course, to more accurately examine the relationship between nutrition and the incidence of blood pressure, it is necessary to pay attention to the nutritional pattern of people from an early age and evaluate its long-term relationship with the incidence of the disease. Tea and coffee consumption and sleep duration were not significantly associated with the prevalence of hypertension in our study or in studies conducted in other parts of the country and the world. Only in a study in the Emirates was a significant relationship found between sleep duration and hypertension (37). Contrary to the study by Yousefzadeh et al. (29) and also in line with the study by Mojahedi et al. (26), no relationship was found between a family history of hypertension and the prevalence of hypertension in young people in the present study. The Singapore study confirms the same result. In explaining this finding, it can be said that the similarity of genetic factors in a family could be a possible reason for this. However, in the Brazilian study, the prevalence of blood pressure was significantly associated with a family history of hypertension, which may be due to incomplete awareness of people about their health. Furthermore, no significant association was found between education level and prevalence of hypertension in this age group in the present study, as in the study by Mojaidi et al. in Mashhad and also in the study in Singapore, but a significant association was found between education level and prevalence of hypertension in India and South America (28 , 38).

Among the limitations of the present study are the small number of the study population and its cross-sectional nature. This is because health measures will be effective when screening can identify people at risk and enable the implementation of a long-term disease control program. Other limitations of this study were the coincidence of the study with the outbreak of COVID-19 and the low attendance of people for health-related screenings.

Conclusion

Since young people are not screened for blood pressure and hypertension is usually asymptomatic before complications occur, young people with the disease are usually unaware of their disease. It is recommended that screening for high blood pressure in young people be performed at least in groups that have risk factors such as obesity or alcohol consumption. Given that all members of society from all social classes visit health centers for tests and examinations before marriage, this group can be considered representative of the youth of society, although not all members of society within the age range of this study marry. Of course, similar studies

have selected different groups, such as soldiers or high school students, each of which has its own limitations.

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Authors Contributions:

The author contributed to the data analysis. Drafting, revising and approving the article, responsible for all aspects of this work.

Ethical Consideration

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Tables

Table 1: Comparison of the frequency of groups of patients with uncontrolled blood pressure, patients with controlled blood pressure, and control group in terms of demographic information

Variable		Hypertensive Patients Not on Medication		Hypertensive Patients on Medication but Uncontrolled		Hypertensive Patients on Medication and Under Control		p-value
		n	%	n	%	n	%	
Monthly Income	Below 1 Million	2	2.33%	3	5.45%	0	0.00%	0.544
	1 to 1.5 Million	3	3.49%	3	5.45%	0	0.00%	
	Above 2 Million	81	94.19%	49	89.09%	19	100.00%	
Gender	Male	42	48.84%	23	41.82%	7	36.84%	0.536
	Female	44	51.16%	32	58.18%	12	63.16%	
Marital Status	Single	45	52.33%	25	45.45%	6	31.58%	0.243
	Married	41	47.67%	30	54.55%	13	68.42%	
Pregnancy History	No	26	30.23%	17	30.91%	4	21.05%	0.284
	Yes	18	20.93%	15	27.27%	8	42.11%	
Abortion History	No	32	37.21%	26	47.27%	11	57.89%	0.327
	Yes	12	13.95%	6	10.91%	1	5.26%	
Occupation	Housewife/Unemployed	14	16.28%	12	21.82%	9	47.37%	0.032
	Self-employed	6	6.98%	8	14.55%	3	15.79%	
	Government Employee	42	48.84%	25	45.45%	4	21.05%	
	Other	24	27.91%	10	18.18%	3	15.79%	
Residence	Urban	66	76.74%	44	80.00%	16	84.21%	0.742
	Rural	20	23.26%	11	20.00%	3	15.79%	
Education	Secondary/Diploma	25	29.07%	18	32.73%	9	47.37%	0.327
	Vocational	15	17.44%	8	14.55%	3	15.79%	
	Bachelor's	33	38.37%	15	27.27%	6	31.58%	
	Master's	13	15.12%	14	25.45%	1	5.26%	
Family History of Hypertension	No	64	74.42%	22	40.00%	17	89.47%	0.99
	Yes	22	25.58%	33	60.00%	2	10.53%	

Table 2: Comparison of the frequency of groups of patients with and without control of blood pressure, patients with and under control of blood pressure, and the control group in terms of the amount of physical activity and exercise per week and the amount of sleep per day

Variable		Hypertensive Patients Not on Medication		Hypertensive Patients on Medication but Uncontrolled		Hypertensive Patients on Medication and Under Control		p-value
		n	%	n	%	n	%	
Level of Physical Activity and Exercise per Week	none	48	55.81%	36	65.45%	16	84.21%	0.318
	1-2 times per week	26	30.23%	15	27.27%	1	5.26%	
	3 or more times per week	12	13.95%	4	7.27%	2	10.53%	
Amount of Sleep per Night	Less than 5 hours	19	22.09%	11	20.00%	7	36.84%	0.126
	5 to 7 hours	33	38.37%	24	43.64%	9	47.37%	
	More than 7 hours per night	34	39.53%	20	36.36%	3	15.79%	

Table 3: Comparison of groups of patients with hypertension on medication and uncontrolled, patients with hypertension on medication and under control, and the control group in terms of smoking, alcohol, and diet history

Variable		Hypertensive Patients Not on Medication		Hypertensive Patients on Medication but Uncontrolled		Hypertensive Patients on Medication and Under Control		p
		N	%	N	%	N	%	
Daily coffee consumption history	No	32	37.21%	16	29.09%	8	42.11%	0.484
	Yes	54	62.79%	39	70.91%	11	57.89%	
Tobacco smoking history	No	59	68.60%	30	54.55%	13	68.42%	0.215
	Yes	27	31.40%	25	45.45%	6	31.58%	
Alcohol consumption history	No	59	68.60%	37	67.27%	13	68.42%	0.986
	Yes	27	31.40%	18	32.73%	6	31.58%	
Fatty and high-calorie food consumption during the week	No	39	45.35%	33	60.00%	14	73.68%	0.042
	Yes	47	54.65%	22	40.00%	5	26.32%	
Fast food consumption during the week	No	35	40.70%	18	32.73%	13	68.42%	0.026
	Yes	51	59.30%	37	67.27%	6	31.58%	
Energy-boosting compounds consumption during the week	No	47	54.65%	33	60.00%	14	73.68%	0.304
	Yes	39	45.35%	22	40.00%	5	26.32%	

Table 4: Logistic regression coefficients of the effect of demographic variables and patient histories on high blood pressure in patients aged 18 to 35 years referring to medical centers in Jahrom city

	Hypertensive Patients on Medication but Uncontrolled				Hypertensive Patients on Medication and Under Control			
	P	OR	lower CI	Upper CI	P value	OR	lower CI	Upper CI
Gender	0.85	0.92	0.37	2.25	0.865	0.87	0.174	4.347
Occupation								
Housewife or unemployed	0.14	2.99	0.71	12.61	0.028	1.968	1.296	91.169
Freelance	0.05	5.3	0.98	28.66	0.041	1.601	1.099	10.26
Government	0.39	1.36	0.53	4.98	0.689	1.452	0.234	9.014
Education								
Cycle and diploma	0.05	0.24	0.06	0.99	0.894	0.836	0.06	11.592
Associate degree	0.6	0.26	0.07	1.07	0.794	1.433	0.096	21.415
Bachelor degree	0.01	0.18	0.05	0.62	0.578	2.065	0.16	26.641
Family history of blood pressure	0.001	6.24	2.55	15.26	0.287	0.368	0.059	2.314
Amount of physical activity Exercise per week								
Inactive	0.04	5.16	1.11	24.02	0.833	1.253	0.155	10.16
1-2 hours	0.37	2.08	0.42	10.25	0.129	0.098	0.005	1.962
Alcohol consumption history	0.7	0.82	0.31	2.2	0.069	4.865	0.885	26.737
Fast food consumption during the week	0.01	0.21	0.07	0.65	0.597	0.577	0.075	4.447
Energy-producing compounds consumption during the week	0.06	2.94	0.94	9.17	0.884	1.15	0.176	7.507
Amount of sleep per night								
Less than 5 hours	0.724	1.239	0.377	4.07	0.15	6.86	0.99	47.513
5 to 7 hours	0.487	1.388	0.55	3.51	0.114	4.103	0.711	23.656