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Prevalence of High Blood Pressure in the Population Covered by Mashhad University of Medical Sciences, Mashhad, Iran, during 2017

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ABSTRACT

Introduction: High blood pressure is one of the most important risk factors for cardiovascular diseases. Hypertension has different prevalence rates across the world. The aim of this study was to determine the prevalence of high blood pressure in the middle-aged and elderly population covered by the Mashhad University of Medical Sciences, Mashhad, Iran.

Materials and Methods: This analytical cross-sectional study was carried out on the secondary data of SINA (Integrated Health Information System) performed on 246,904 people, aged ≥ 30 years, registered in 2017. Diagnostic testing was performed according to the clinical guidelines of the Seventh Report of the Joint National Committee on Prevention, Detection, and Evaluation (JNC7). The data were analyzed using the SPSS software, version 22. Chi-square tests were used to analyze the relationships between the variables. A p-value less than 0.05 was considered statistically significant.

Results: The overall prevalence of hypertension was estimated at 32.3%. With regard to gender distribution, the prevalence of this disorder among males and females was obtained as 32% and 32.5%, respectively. Additionally, this disorder had the prevalence rates of 25.3% and 38.8% in cities and villages, respectively.

Conclusion: It seems that the prevalence of high blood pressure is higher in the studied population than in those living in many parts of Iran and the world. Accordingly, it is required to plan serious interventions in this regard.

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Introduction

Hypertension is one of the most important risk factors for cardiovascular diseases and the most important cause of mortality and morbidity worldwide. This disorder accounted for almost 7.6 million deaths (13-15% of total deaths) and 92 million years of morbidity worldwide in 2001. Hypertension doubles the risk of cardiovascular diseases, including coronary heart disease, congestive heart failure, ischemic and hemorrhagic stroke, kidney failure, and peripheral arterial disease (1). Evidence shows that there is an epidemic of hypertension all over the world, and it has affected about one billion people worldwide. The incidence and prevalence of hypertension vary across different countries and populations. In this regard, this disorder has the prevalence rates of 11-30%, 20-33%, 18-22%, 44%, 25-30%, and 33.3% in Latin America, Africa, America, some European countries, China/Korea/Taiwan, and India, respectively (2-4).

A systematic review that included 90 countries to address the global disparities of hypertension prevention and control indicated that more than 31% of the adult population in the world had high blood pressure in 2010. In the mentioned study, the prevalence of hypertension was reported to be higher in low- and middle-income countries (31.5%) than in high-income countries (28.5%). In contrast, the awareness, treatment, and control of the disease were found to be at a far lower level in low- and middle-income countries. From 2000 to 2010, the prevalence of hypertension in countries with high income declined by 2.6%, and disease awareness, treatment, and control improved. However, low- and middle-income countries witnessed a 7.7% increase in disease prevalence during this period (5).

In another study conducted in the US, the prevalence of hypertension in 1999 was reported as 29%, which remained unchanged until 2014. Nonetheless, controlled hypertension during this period increased from 31.5% to 53.3% (6). There is strong evidence regarding the recent onset of hypertension epidemic in developing countries, such as Iran (7, 8). Longer life expectancy, effective treatment, and better care will decrease the prevalence of this disorder. Propagation of western lifestyle and urbanization in these countries can dramatically increase the morbidity and mortality of cardiovascular diseases, especially those associated with hypertension (2, 7, 9).

Iran is a vast country with a population of different ethnicities and various cultures and lifestyles. Based on the evidence, the prevalence of hypertension is influenced by several factors, such as age, gender, race, and economic status (10). The prevalence of this disorder in Iran has gradually increased in recent years. In a meta-analysis performed on the articles published from 1996 to 2004, the prevalence of hypertension was reported as 21.9%. The overall prevalence rates of hypertension were estimated at 23% and 50% at the age of 30-55 and > 55 years, respectively (11-13). In another study performed between 2002 and 2014, the prevalence of hypertension in seniors over 60 years was 33% in males and 57% in females. However, there was a significant increase in the prevalence during the study years to 56% in males and 71% in females in 2014 (13).

The above-mentioned evidence is indicative of a significant difference in the prevalence of hypertension in Iran. This rising trend highlights the need for the implementation of ongoing and targeted studies to evaluate the course of this disease and its effective management strategies.

Materials and Methods

This cross-sectional study was conducted on the health assessment data of 246,904 people with ≥ 30 years of age covered by the Mashhad University of Medical Sciences registered in SINA (Integrated Health Information System) with the aim of determining the prevalence of hypertension.

Inclusion and exclusion criteria

Initially, the health assessment of the people aged ≥ 30 years, covered by the University and referred to Comprehensive Health Centers in 2017, was performed by trained health care providers using the acquired skills and techniques. The results were then collected and recorded in SINA Electronic Health Record System in forms of the health assessment of middle-aged subjects (i.e., 30-59 years) and seniors (i.e., over 60 years). The patients who had incomplete

Information or failed to regularly refer for follow-up were excluded from the study.

The assessment included the measurement of the patient's blood pressure on both hands at 5-minute intervals according to the standards available. The measures were then recorded in an appropriate form. According to the JNC7 clinical guidelines, the diagnostic criteria included a mean systolic blood pressure level of ≥ 140 mmHg, a mean diastolic blood pressure of ≥ 90 mmHg, and a history of hypertension (Table 1) (14). Finally, the prevalence of hypertension in the study population was determined based on the recorded blood pressure.

Table 1: Blood pressure classification based on the clinical guidelines recommended in the Seventh Report of the Joint National Committee on Prevention, Detection, and Evaluation

BP classification	SBP (mmHg)	DBP (mmHg)
Normal	<120	and <80
Prehypertension	120-139	and 80-89
Stage I hypertension	140-159	or 90-99
Stage II hypertension	≥160	or ≥120

BP: blood pressure, SBP: systolic blood pressure, DBP: diastolic blood pressure

Statistical analysis

Data analysis was performed using SPSS statistical software, version 22. Since this was a descriptive-analytic study, statistical tables were used to describe the results. Additionally, the Chi-square test was utilized to analyze the relationships between the variables. A p-value less than 0.05 was considered statistically significant.

Results

The mean age of the study population was 52.019±14.7129 years. The overall prevalence of hypertension was also estimated to be 32.3%. Table 2 shows the demographic characteristics of the participants. In addition, the population living in the city under study had a slightly higher hypertension prevalence (51.9%) in comparison to the rural population (48.1%) (P=0.013).

Table 2: Measured systolic and diastolic blood pressure status of the study group based on a classification made by the Seventh Report of the Joint National Committee on Prevention, Detection, and Evaluation

		Frequency	Percent
Mean systolic blood pressure	Normal	176.447	71.5
	Prehypertension	61.159	24.8
	Stage I hypertension	8.394	3.4
	Stage II hypertension	902	.4
Mean diastolic blood pressure	Normal	222.296	90.0
	Prehypertension	20.149	8.2
	Stage I hypertension	3.695	1.5
	Stage II hypertension	760	0.3

Table 3 illustrates the distribution of hypertension prevalence based on age, gender, nationality, education, and place of residence in the study population in 2017.

Table 3: Demographic characteristics of the participant

Classification	Percent	Hypertension	P-value
Age of 30-40	25.9%	2.1%	P<0.0001
Age of 40-50	20.4%	17.4%	
Age of 50-60	20.5%	42.7%	
Age of 60-70	19.2%	58.1%	
Age of 70-80	11.8%	68.0%	
Age of >80	2.1%	71.5%	
Middle-aged	66.8%	17.9%	P=0.001
Senior	33.2%	61.5%	
Male	28.6%	32.0%	P=0.4
Female	71.4%	32.5%	
Non-Iranian	1.7%	28.0%	P<0.001
Iranian	98.3%	32.4%	
Metropolis	4.1%	35.9%	P=0.013
City under one million	22.0%	21.9%	
Outskirt	22.1%	26.8%	
Village	51.9%	38.8%	
Total		32.3%	

Discussion

The overall prevalence of hypertension in this study was 32.3%. This amount in Iran is approximately equal (31.1%) to the mean blood pressure obtained from a study performed on 90 countries during 1996-2014 (5). Numerous studies have been conducted in Iran and elsewhere around the world to determine the prevalence of hypertension and reported different results. In a review article, the prevalence of hypertension was reported to vary between and within countries during 2001-2012 (6, 15-20). These statistics differed by the country's income level (i.e., 28.5% in high-income countries and 31.5% in middle- and low-income countries) (5).

The prevalence of this disorder was higher in our study than in some countries, such as the US (6), Vietnam (21), Nairobi (22), some regions in India (15), Cameroon (19), China (23), and Alaska (18), but lower than those of others countries, like some areas of India (16) and Portugal (20). The prevalence of hypertension in this study was higher than those reported in other studies and meta-analyses conducted in Iran in recent years (12, 24-26).(Figure 1)

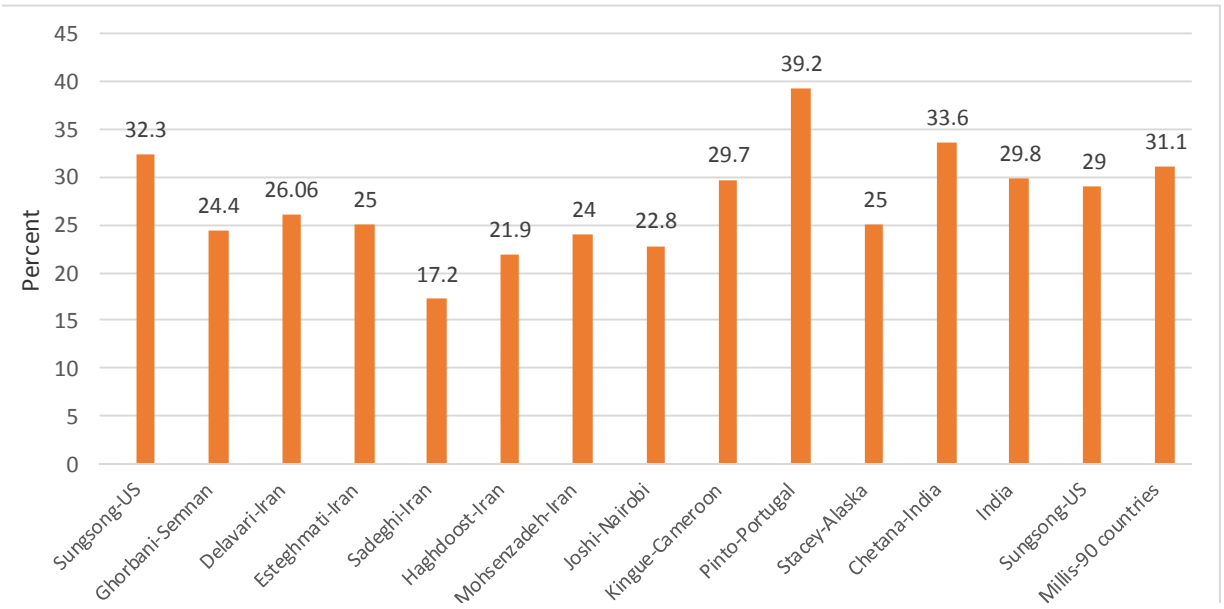

Figure 1: Prevalence of hypertension in some parts of the world compared with this study

Evidence from previous studies indicates a higher prevalence of hypertension in the elderly. In this study, the prevalence of hypertension was significantly higher in the elderly than in the middle-age people. The overall prevalence of hypertension in the elderly was 61.5%. The prevalence of this disorder increased with age, reaching 54.4%, 57.8%, 61.5%, 65.9%, and 71.5% at the ages over 50, 55, 60, 65, and 80 years, respectively. Compared with previous reports in Iran, our results revealed the hypertension prevalence rates of 38.8% and 36.1% in people over 60 years of age, which is lower than the value obtained in our study last year (24, 27, 28).

This finding is consistent with those of other studies shown in Figure 2 (18, 29). In the current study, the people aged over 50 years had a higher prevalence of hypertension (61.5%) than those in the studies performed in India (29), Alaska (18), and Iran (24, 25, 28, 30). However, this value was lower in the current study than in such countries as China, Ghana, Mexico, and the US (29, 31). Studies on the elderly over a period of time have shown a gradual increasing trend in the prevalence of hypertension (13, 31).

In this study, urban areas had a lower hypertension prevalence (25.3%) as compared to the rural areas (38.8%), which is in line with the results of similar studies performed by Anchala et al., Do et al., and Ghorbani et al. (15, 27). However, it is inconsistent with those of another study carried out in Iran (32). In addition, in the current research, the prevalence of high blood pressure in the villages was higher than those reported in other studies. In this research, hypertension had a higher prevalence in women (32.5%) than in men (32%), which is similar to the results of the studies conducted in India (2), Portugal (20), and other studies in Iran (13, 24, 26, 27). However, in a study performed in Vietnam (21), the incidence was higher in males than in females

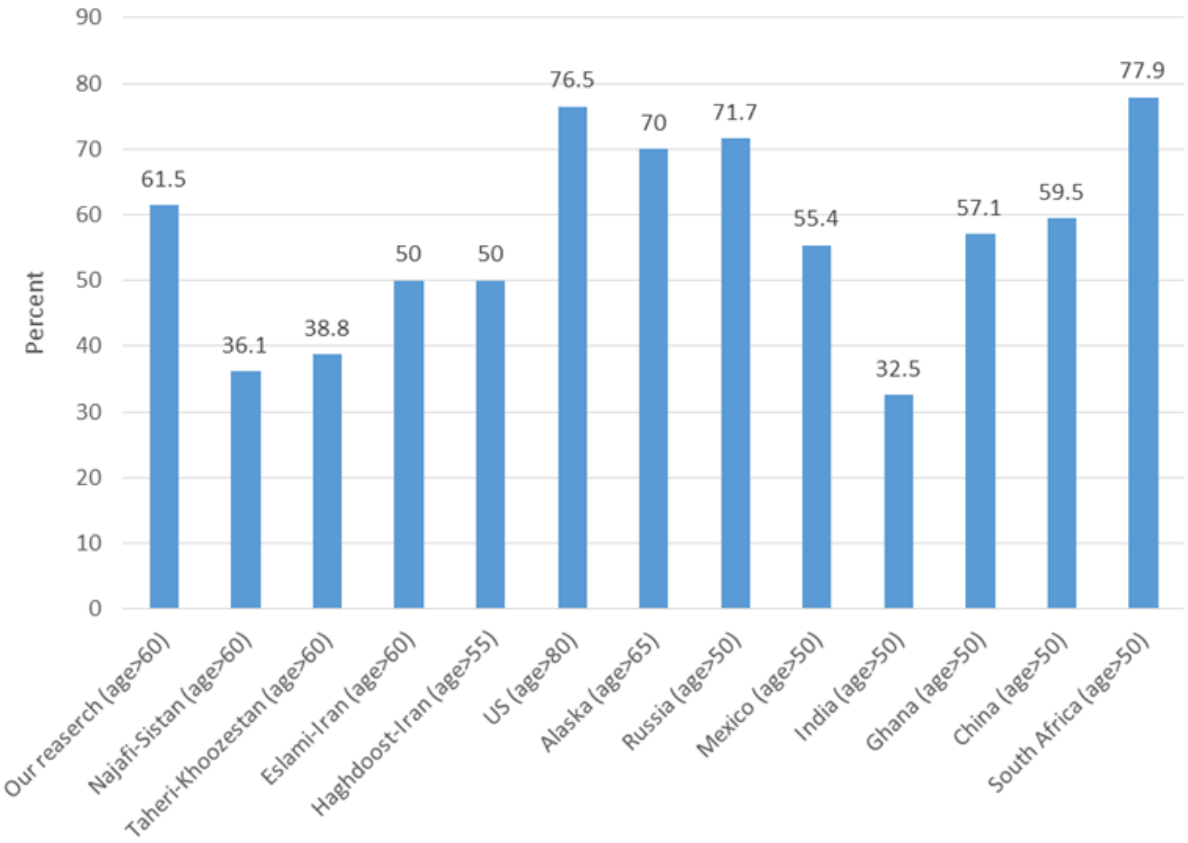

Figure 2: Prevalence of hypertension in the elderly in some parts of the world compared with this study

Limitations and strengths

One of the strengths of this study is the large sample size, which increases the generalizability of the study and allows for a broader and more comprehensive view of the study. The electronic health record system has been launched in recent years. Moreover, the prevalence of hypertension has not been studied in the population covered by Mashhad University of Medical Sciences, especially with such a high sample size. Therefore, this study can be used to guide policymakers in planning and managing high blood pressure.

One of the limitations of the present study, however, can be attributed to the inadequate collection of health information by physicians and healthcare providers. Lack of full coverage of the urban population in the system can be indicated as another weakness. Therefore, it is recommended that in cities, especially in the private sector for health services, electronic health record systems start operating so that the population of Mashhad metropolis who are less likely to receive such services, could be covered as well.

Yet, one more limitation in the survey can be the fact that SINA registry system contains information of the individuals referred to health centers. Hence, sampling was not carried out and there exists some sort of selection bias in reporting the high blood pressure in these populations as "prevalence of high blood pressure."

Conclusion

The results of the study suggested that the prevalence of hypertension was higher in the population covered by the Mashhad University of Medical Sciences than in those living in other parts of Iran and even the world. Although age groups vary in different studies and can partially disrupt the judgment process, these results may serve as a warning to planners and authorities to pay more attention to this cardiovascular risk factor.

Further research

The use of the data recorded in the electronic health record system of the population covered by universities nationwide may provide new insight into the relative frequency, potency of risk factors, and protective factors of hypertension. Given the specific socioeconomic and cultural conditions of the society, such information can be used by health planners for better planning and reducing the disease burden. In this study, the prevalence of hypertension was found to be higher in women, as well as in rural areas. One of the reasons for these findings could be the higher rates of women and rural residents referring to the comprehensive health centers to receive health care services, which require more controlled studies.

Ethical considerations

This study was reviewed by the Ethics Committee of the School of Medicine in Mashhad University of Medical Sciences and approved with the ethics ID of 1397.346IR.MUMS.MEDICAL.REC. In addition, the data were provided to the researchers anonymously and without specifications. All codes of ethics of the country were also followed in the publication of the scientific material.

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Authors' contributions

All authors equally contributed to the designing, running, and writing of all parts of the research.

Conflicts of interest

The authors declared no conflicts of interest regarding this manuscript.

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