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Review Article

Hypertension prevalence, awareness, and control in Arab countries: A systematic review

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Abstract

One billion of the world's population has hypertension, resulting in four million deaths per year. Data on the prevalence of hypertension in the Arab world are very limited. This review summarizes existing knowledge regarding prevalence, awareness, and control of hypertension in Arab countries. The PubMed, Cochrane Library, Scopus, and CINAHL databases were searched for publications on HTN among Arab people from 1980 to January 2011. Only 13 studies were identified in the literature from 10 Arab countries. The overall estimated prevalence of hypertension was 29.5% ($n = 45\,379$), which indicates a higher prevalence of hypertension among Arabs compared to people from the USA (28%) and sub-Saharan African (27.6%). Awareness of hypertension was reported for 46% of the studies and varied from 18% (Jordan) to 79.8% (Syria). The control rate varied from 56% (Tunisia) to 92% (Egypt and Syria). The prevalence of hypertension was found to increase with age, occurring more frequently in Arab women.

Key words

adherence, Arab, hypertension, lifestyle modification, systematic review.

INTRODUCTION

Hypertension (HTN) is a major risk factor for cardiovascular disease (CVD), which is the leading cause of morbidity and mortality worldwide (World Health Organization, 2004). One billion of the world's population has HTN, resulting in four million deaths per year (World Health Organization, 2004). In fact, HTN is the third leading cause of death in the world, and is responsible for one in every eight deaths worldwide, with a mortality rate of 13% (World Health Organization, 2004). In addition, it is estimated that one-third of the world's population (1.5 billion people) will have HTN by 2025 as a result of aging and increased obesity (Libby & Braunwald, 2008). The prevalence of HTN is increasing, despite effective drug therapy and lifestyle modification programs that target hypertensive patients. Uncontrolled blood pressure (BP) can lead to coronary heart disease, congestive heart failure, stroke, and renal failure (Lakhani *et al.*, 2003). Screening, early detection, and control of HTN are critical, as the risk of CVD doubles for each 20 mmHg increase in systolic BP or 10 mmHg increase in diastolic BP above 115/75 mmHg (Chobanian *et al.*, 2003). In addition, controlling

BP lowers the risk of stroke by 30%, myocardial infarction by 20–25%, and heart failure by more than 50% (World Health Organization, 2004). HTN extracts a high financial cost, which could be contained by utilizing effective screening and prevention programs (World Health Organization, 2004). Most Arab countries have the expertise and resources to develop and implement preventive measures to reduce morbidity and mortality from potentially preventable complications of HTN, such as stroke, myocardial infarction, and renal failure. Thus, an examination of HTN prevalence, awareness, control, and risk factors in Arab countries is an important foundation for prevention programs.

To our knowledge, data on the prevalence of HTN in the Arab world are limited, and there is no published literature review on the prevalence, awareness, and control of HTN in Arab countries. Thus, the purpose of this paper was to summarize existing knowledge regarding prevalence, awareness, and control of HTN in Arab countries. In addition, areas for future research to raise awareness of the importance of HTN prevention and treatment in Arab people will be identified.

ARAB COUNTRIES

The Arab world consists of 22 developing nations and territories, with a combined population of 358 million people. These countries are Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, the Palestine territory (Gaza Strip and West

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Bank), Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates, and Yemen. Although Arab states vary socioeconomically, they share a similar language, culture, and religion, all of which play a major role in designing and providing population-based health promotion and preventive care programs, which are the most important approaches for tackling HTN morbidity and mortality. The World Health Organization and the Joint National Committee on the Prevention, Detection, Evaluation, and Treatment of High Blood Pressure have emphasized the role of health promotion and disease prevention as the most cost-effective approaches to contain the HTN epidemic (Chobanian *et al.*, 2003; World Health Organization, 2004). Efforts to raise awareness of HTN stress the importance of health promotion and disease prevention as important arenas to improve the quality of care and to contain the cost of health care in the Arab world.

The Arab world characterized by a large proportion of young people with an average life expectancy of 70 years (World Health Organization, 2012). The region has a high prevalence of obesity (13% for men and 24.5% for women), diabetes mellitus (11.3%), and smoking (30% among men and 5% among women) (World Health Organization, 2012). Currently, CVD has emerged as one of the leading causes of death in this population.

SEARCH STRATEGIES

The PubMed, Cochrane Library, Scopus, and CINAHL databases were searched for publications on HTN among Arab people from 1980 to January 2011. The search was performed with the following keywords: HTN, blood pressure, and cardiovascular risk factors, combined with Arabs, Arab World, Arab countries, Middle East, North Africa, Arabian Gulf, and specific country names. A manual search of reference lists from identified papers supplemented the electronic search. We included only studies that were conducted in an Arab country within the past 20 years, included

adults aged 18 years and above, provided data on the prevalence or incidence of HTN, measured BP using standard measurement procedures, and defined HTN defined as BP $\geq 140/90$ mmHg and/or self-reported use of antihypertensive medication. Studies that used only self-reporting of history of HTN without BP measurement were excluded. Studies that included the prevalence of HTN for only men or women were also not included. The search was conducted in English and was limited to articles published in Arabic and English. However, all reviewed studies were in the English language.

The prevalence of HTN was estimated by dividing the total number of participants with HTN (BP $\geq 140/90$ mmHg and/or use of antihypertensive medication) by the total number of participants in all studies. The number of participants with HTN in each study was estimated by multiplying the total number of study participants by the prevalence of HTN in the study. Awareness of HTN was defined as self-reporting of any prior diagnosis of HTN by a healthcare professional. The control of HTN was defined as the current use of antihypertensive medication associated with an average BP $< 140/90$ mmHg, and for diabetic individuals, BP $< 130/80$ mmHg (Chobanian *et al.*, 2003; World Health Organization, 2004).

LITERATURE RESULTS

The country name, HTN incidence and prevalence, sex, and age of the participants were recorded for the studies. Each paper was reviewed and analyzed descriptively. Thirteen studies from 10 Arab countries met the inclusion criteria (Fig. 1). Studies were available for Jordan ($n = 3$), Algeria ($n = 2$), Morocco ($n = 1$), Tunisia ($n = 1$), Egypt ($n = 1$), Syria ($n = 1$), Saudi Arabia ($n = 1$), Qatar ($n = 1$), United Arab Emirates ($n = 1$), and Oman ($n = 1$). Two studies from Jordan were excluded; one study excluded participants diagnosed with HTN and reported only HTN prevalence for undiagnosed patients, and the second study included only

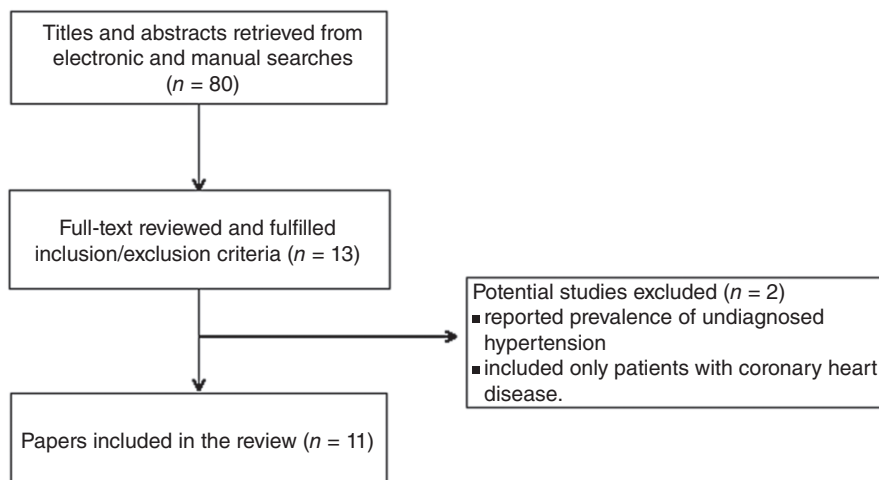


Figure 1. Summary of literature search.

patients with coronary heart disease. The sample sizes ranged from 545 to 17,320. Sample sizes for all included studies were adequate. According to EPI INFO (version 7; Center for Disease Control, Atlanta, GA, USA), a sample size of 400 is adequate to detect the prevalence of HTN between 10% and 50% with 5% precision and 95% confidence. Two studies defined HTN as an average BP \geq 160/95 mmHg and/or use of antihypertensive medication, while nine studies defined HTN as an average BP \geq 140/90 mmHg and/or use of antihypertensive medication. Seven studies (64%) used manual sphygmomanometers, whereas four studies (36%) used electronic BP monitors to measure BP. The number of BP measurements ranged from one to four between the studies, and the average was usually used to estimate HTN prevalence in the studies. Five studies sampled national populations and reported results for urban and rural areas, five studies included only urban participants, and one included Saharan individuals. In general, regional studies showed higher and a more varied prevalence of HTN compared to national representative samples. The prevalence of HTN in national studies ranged from 25.2% to 39.6%, and sample sizes ranged from 1802 to 17,320 participants. Table 1 summarizes the characteristics of the studies.

Prevalence, awareness, and control

The overall crude prevalence of HTN (BP \geq 140/90 mmHg and/or use of antihypertensive medication) reported in 11 studies ($n = 45,379$) was 29.5%. Two studies used a higher cut-off point of HTN as BP \geq 160/95 mmHg ($n = 1502$) and reported a lower prevalence of HTN prevalence compared to the other studies ($n = 43,877$, 17.9% vs 29.9%). No study reported an incidence of HTN in Arab countries. HTN prevalence varied widely between and within countries. Between countries, the prevalence of HTN ranged from 16.3% in Jordan (BP \geq 160/95 mmHg) to 44% in Algeria (Jaddou *et al.*, 2000; Temmar *et al.*, 2007), while within countries, the prevalence varied from 35.3% to 44% in Algeria (Ben Khedda *et al.*, 2005; Temmar *et al.*, 2007). For national studies, HTN prevalence ranged from 25.2% (Oman) to 39.6% (Morocco) (Al Riyami & Afifi, 2003; Tazi *et al.*, 2003).

Only five studies reported the level of HTN awareness (Ibrahim *et al.*, 1995; Ghannem & Fredj, 1997; Jaddou *et al.*, 2003; Al-Nozha *et al.*, 2007; Maziak *et al.*, 2007). In four studies, almost two-thirds of participants with detected HTN were unaware of their high BP (not diagnosed with HTN), ranging from 62.5% in Egypt to 79.8% in Syria. Even though one study conducted in Jordan reported that most hypertensive patients (82%) were aware of their diagnosis (Jaddou *et al.*, 2000), more than two-thirds of hypertensive patients did not achieve controlled BP. This rate of uncontrolled HTN is similar to the findings of other studies in Arab countries, where uncontrolled rates ranged from 56% (Tunisia) to 92% (Egypt and Syria) (Ghannem & Fredj, 1997; Jaddou *et al.*, 2000; Tazi *et al.*, 2003; Bener *et al.*, 2004; Al-Nozha *et al.*, 2007; Maziak *et al.*, 2007; Baynouna *et al.*, 2008). However, none of these studies accounts for the lower BP control for diabetic individuals ($< 130/90$ mmHg).

Table 1. Main studies in the literature review

Authors, Year	Country	Setting	Sample size	HTN definition	Mean of BP measurements	BP measurement	HTN (%)	Minimum/mean age (years)	Female (%)
Ibrahim <i>et al.</i> , 1995	Egypt	National	6733	$\geq 140/90$	Mean of all 4	Manual†	26.3	≥ 25	56.5
Ghannem & Fredj, 1997	Tunisia	Regional	957	$\geq 160/95$	Mean of all 2	Electronic	18.8	≥ 20	70
Jaddou <i>et al.</i> , 2000	Jordan	Regional	545	$\geq 160/95$	One reading	Manual†	16.3	≥ 25	62
Tazi <i>et al.</i> , 2003	Morocco	National	1802	$\geq 140/90$	Mean of all 2	Manual†	39.6	≥ 20	58.1
Al Riyami & Afifi, 2003	Oman	National	7011	$\geq 140/90$	Mean of all 2	Manual†	25.2	≥ 20	50
Bener <i>et al.</i> , 2004	Qatar	Regional	1208	$\geq 140/90$	Mean of all 3	Manual	32.1	≥ 20	58
Ben Khedda <i>et al.</i> , 2005	Algeria	National	1478	$\geq 140/90$	Mean of all 3	Electronic	35.3	44.2	61.1
Al-Nozha <i>et al.</i> , 2007	Saudi	National	17,230	$\geq 140/90$	Mean of all 2	Manual	26.1	≥ 30	52.3
Maziak <i>et al.</i> , 2007	Syria	Regional	6252	$\geq 140/90$	Mean of first 2 or 3	Electronic	40.6	35.3	54.8
Temmar <i>et al.</i> , 2007	Algeria	Regional	1346	$\geq 140/90$	Mean of the last 2	Electronic	44	≥ 40	52.9
Baynouna <i>et al.</i> , 2008	United Arab Emirates	Regional	817	$\geq 140/90$	Mean of all 2	Manual	37.3	≥ 20	51

†Sphygmomanometer used. BP, blood pressure; HTN, hypertension.

Sex and age

Most studies had more than 50% females and included adults aged 20 years and older. Five studies found that HTN prevalence was greater in females (Ibrahim *et al.*, 1995; Tazi *et al.*, 2003; Bener *et al.*, 2004; Al-Nozha *et al.*, 2007; Temmar *et al.*, 2007), whereas two studies indicated that HTN prevalence was higher in males (Maziak *et al.*, 2007; Baynouna *et al.*, 2008). However, four studies reported no significant association between HTN prevalence and sex (Ghannem & Fredj, 1997; Jaddou *et al.*, 2000; Al Riyami & Afifi, 2002; Ben Khedda *et al.*, 2005). The prevalence of HTN increased with age. This trend was similar for both males and females.

DISCUSSION

The literature review revealed a higher prevalence of HTN in Arab countries (29.5%) compared to the USA (28%) and sub-Saharan Africa (27.6%) (Wolf-Maier *et al.*, 2003; Kearney *et al.*, 2005). However, the prevalence of HTN in Arab countries was lower compared to European countries (44.2%) (Wolf-Maier *et al.*, 2003). Urbanization and industrialization account for changing social, economic, and environmental status, as well as lifestyle behaviors that increase behavioral and biologic risk factors (Libby & Braunwald, 2008). Therefore, a higher prevalence of obesity, physical inactivity, and increased salt and fat intake from consuming processed foods as a result of urbanization and industrialization are likely explanations for higher HTN in Arab populations.

Our findings indicate that the prevalence of HTN varied between and within countries. The reason for this variability is likely multifactorial, and could have occurred because of differences in study designs and timeframes. For example, most of the studies that reported low prevalence (e.g. Jordan and Tunisia) were conducted more than 15 years ago in community settings and used a higher cut-off point to define HTN (BP \geq 160/95 mmHg). Inclusion criteria might also have accounted for some differences in HTN prevalence. For instance, a study in Algeria that included participants 40 years and older might have accounted for a higher prevalence of HTN than another study that included individuals 18 years and older (44% vs 35.3%). The difference in methodology of BP measurement between these studies might also have influenced the prevalence of HTN and explain the variability. The main differences between these studies were the use of different equipment (i.e. sphygmomanometer vs electronic BP monitor), the number of BP measurements, and the method used to estimate the mean BP measurements (i.e. last two measurements vs all measurements). However, findings from national surveys were more consistent, with prevalence rates ranging from 25.2% (Oman) to 39.6% (Morocco). Differences in the lifestyle and socioeconomic status of Arab countries, as well between rural and urban areas within countries, might also explain the variability in the findings. The geographic variations in HTN prevalence have been well documented (Wolf-Maier *et al.*, 2003). The prevalence of HTN varies by age and sex. In the reviewed studies, the prevalence of HTN

was found to increase by age, which is consistent with reports from Europe and the USA (Wolf-Maier *et al.*, 2003), as well as from sub-Saharan Africa (Addo *et al.*, 2007). In addition, HTN tends to occur more frequently in Arab women compared to Arab men, which is contrary to data from the USA and sub-Saharan Africa where the prevalence of HTN is equal for both men and women (Wolf-Maier *et al.*, 2003; Addo *et al.*, 2007). This finding could be explained by the higher prevalence of obesity in women, as most studies indicated that HTN was more prevalent among obese individuals. In addition, social traditions, which emphasize traditional gender roles that women should bear children and take care of their family, limit women's recreational and physical activities (Maziak *et al.*, 2007). Another factor that affected HTN prevalence was the education levels of Arab people in each country. One study found that educational level had a significant influence on the prevalence of HTN; illiterate people in particular were more likely to be hypertensive compared to educated participants (Al-Nozha *et al.*, 2007).

On average, the controlled rate of HTN in Arab countries is comparable to the 8% and 23% reported for the USA and European countries, respectively (Wolf-Maier *et al.*, 2003). With regard to HTN awareness, our findings were in contrast to those of economically-developed countries, where approximately half to two-thirds of hypertensive patients were aware of their diagnosis (Kearney *et al.*, 2004). Limited access to healthcare services, especially in rural areas, and a lack of preventive care (Jabbour, 2003) coupled with the silent symptoms of HTN, might contribute to the lack of HTN awareness and inadequate HTN control rate among the Arab population.

CONCLUSION

This systematic review of the literature included various studies that used different designs, inclusion criteria, and different definitions of HTN (BP \geq 140/90 mmHg vs BP \geq 160/95 mmHg), published from 1995 to 2008. The findings provide an approximate assessment of the prevalence of HTN, with many limitations in the accuracy of the measure, as a majority of studies reported only the crude prevalence of HTN. The data presented report an overall higher prevalence of HTN among the adult Arab population. Clearly, HTN is a major risk factor affecting a large portion of Arab people, making them vulnerable to coronary vascular diseases, renal diseases, and cerebrovascular diseases. The findings indicate a higher prevalence of HTN in Arab countries compared to the USA and sub-Saharan Africa. Moreover, the review indicated that HTN is more prevalent among women, obese participants, and older individuals, and that there is a lack of HTN awareness.

HTN awareness and prevention programs would provide the most cost-effective ways to prevent HTN (Chobanian *et al.*, 2003; World Health Organization, 2004). Primary prevention programs should emphasize adopting healthy lifestyles (e.g. weight control, exercise, reduced sodium intake, and limited alcohol consumption) as effective means to prevent and control HTN. Additionally, initial screening for

HTN in early adulthood should be established in Arab countries to tackle HTN morbidity and mortality early in life. Improving the awareness, control, and treatment of HTN, as well as encouraging Arab people to adopt and maintain healthy lifestyles, are the keys to preventing a HTN epidemic. Furthermore, Arab countries should undertake regular national health surveys, which would include rigorous measurement of HTN status, to track trends and changes in HTN status and to develop national strategies to contain HTN epidemics. Successful efforts and initiatives in one Arab country would support and guide other countries to adopt these prevention programs that target HTN screening and awareness.

This literature review supports the need for further investigation of HTN prevalence, awareness, treatment, and control in the Arab population. Future research that identifies risk factors for HTN and factors that contribute to the lack of awareness, control, and medication adherence are warranted. Such research is essential to developing and designing cost-effective awareness and prevention programs that would help individuals overcome these barriers.

CONTRIBUTIONS

Study Design: AT.

Data Collection and Analysis: AT, LV, JM, NP, LP, DM.

Manuscript Writing: AT, LV, JM, NP, LP, DM.

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