

The prevalence of hypertension and its associated risk factors in a newly developed country

Abdulbari Bener, FRSS, MFPHM, Jasim Al-Suwaidi, MD, FACC, Khalifa Al-Jaber, MD, FFPHM, Saleh Al-Marri, MD, FRCP, Mohammed H. Dagash, MBBS, MD, Isam-Eldin A. Elbagi, MD, MRCGP.

ABSTRACT

Objective: The aim of the present study was to determine the prevalence of hypertension and cardiovascular disease (CVD) risk factors and its association with the sociodemographic, behavioral, and lifestyle characteristics of the adult qatari population.

Methods: This is a cross-sectional study, which was carried out in primary health care clinics (PHCs). The survey was conducted from January through to July 2003 among qatari nationals 25-65-years of age. Of the 1500 patients who were approached to participate in study, 1208 (80.5%) gave their consent. Face-to-face interviews were based on a questionnaire that included variables on age, sex, socioeconomic status (SES), parity, income level, cigarette smoking, physical activity, lifestyle, body mass index (BMI), and blood pressure. Hypertension was defined according to the world health organization criteria as systolic blood pressure (SBP) >140 mm Hg or diastolic blood pressure (DBP) >90 mm Hg, or both.

Results: Overall, the prevalence of hypertension (BP \geq 140 or \geq 90 mm Hg, or both or known hypertensive) was

32.1% (32.6% in men and 31.7% in women). The age-standardized prevalence of hypertension (adjusted to the adult population of Qatar) was 31.1% (95% confidence interval 26.7–35.5%) in men and 30.2% in women (95% confidence interval 25.8–34.6%). The CVD risk factor of obesity was more prominent among women 528 (78.3%) than among men 334 (68.9%) ($p < 0.001$). Physical inactivity was again predominant among women and found to be highly significant. A stepwise logistic regression analysis revealed that diabetes ($p < 0.0001$); hormonal problems ($p < 0.0001$), consumption of animal fats ($p < 0.0001$), risk of heart disease ($p < 0.0001$), and BMI ($p = 0.0307$) were all associated with hypertension.

Conclusion: The present study was directed at determining the prevalence and risk factors of high blood pressure in the adult population of Qatar. The characterization of these factors will contribute to defining more effective and specific strategies to screen for and control hypertension and CVD.

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Qatar, like many other developing countries, has witnessed rapid change in many aspects of life during the last 2 decades. There has been a dramatic rise in the national economy expressed in terms of per capita income. These dramatic changes have had a great impact on urbanization and lifestyle in

the Qatari community; as a result, hypertension has become the main public health problem. Hypertension is considered a major risk factor for the development of cardiovascular diseases (CVD).¹⁻⁷ Other risk factors such as nutritional problems, stress, behavioral factors, and unhealthy

From the Department of Medical Statistics and Epidemiology (Bener), Department of Cardiovascular and Cardiology (Al-Suwaidi), Department of Medicine and Endocrinology (Dagash), Director of Primary Health Centers (Al-Marri), Hamad Medical Corporation, Undersecretary, (Al-Jaber) Ministry of Public Health, Family and Community Medicine (Elbagi), West Bay Primary Health Center, Doha, Qatar.

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Address correspondence and reprint request to: Prof. Abdulbari Bener, Adviser WHO and Head of Department of Medical Statistics and Epidemiology, Hamad General Hospital and Hamad Medical Corporation, PO Box 3050, Doha, Qatar. Tel. +974 4393762/4393763. Fax. +974 4393769. E-mail: abener@hmc.org.qa, abaribener@hotmail.com

lifestyles probably also influence the prevalence of CVD. A recent study has reported that the prevalence of hypertension ranged from 28-44% in European countries, strongly correlating with stroke mortality and more modestly with the rate of CVD.⁸ Data available from several Eastern Mediterranean countries⁹ indicate that hypertension is emerging as an important cause of morbidity and mortality; surveys on hypertension report prevalence rates varying from 20-30% among adults.⁹ A significant association between hypertension and diabetes mellitus (DM) is also reported by several authors.¹⁰⁻¹² In Western countries, a striking decreasing tendency in CVD mortality and morbidity has been observed.¹⁻⁸ In Qatar, on the other hand, CVD has become the leading cause of morbidity and mortality over the past 2 decades. The aim of this study was to determine the prevalence of hypertension and CVD risk factors and its association with the socio-demographic, behavioral and lifestyle characteristics of the adult Qatari population.

Methods. This is a cross-sectional study designed to determine the relationship between hypertension and cardiovascular risk factors among the adult Qatari population between 25 and 65-years of age. The survey was conducted between January and July of 2003. A multistage stratified cluster sampling design was developed using the administrative divisions of the Qatari Primary Health Center clinics in regions that had approximately equal numbers of inhabitants. The sample size was determined on a prior presumption that the prevalence rate of hypertension in Qatar would be more or less similar to rates found for several other countries in the Eastern Mediterranean,^{8,9} where the reported prevalence of hypertension among adults ranged from 20-30%. Assuming the prevalence of hypertension to be 25%, with the 95% confidence interval for an error of 5% at the level of significance, a sample size of 1500 would be required to meet the specific objectives of the study. Of the total of 22 primary health care clinics available, 10 were selected at random. Of these, 8 were located in urban and 2 in semiurban areas of Qatar. Finally, subjects were selected systematically 1 in 2 using a sampling procedure. During the study period, 1500 subjects were approached, of whom 1208 responded to the questionnaire, for a response rate of 80.5%. The questionnaire and criteria for hypertension were designed to meet the objective of this study. The survey was based on standardized interviews performed by trained health professionals and nurses. Informed consent was obtained from each person who agreed to participate in the study, which was carried out according to the Declaration of Helsinki. The

participants were interviewed by health professionals and nurses concerning their age; gender; nationality; educational level; occupation; place of residence (urban and semiurban), smoking habits; physical activity; lifestyle; BMI, eating habits; previous history of hypertension, diabetes, and CVD; family history of heart attack and stroke; and current use of medications for hypertension or diabetes, or both. For both patients and controls, smoking behavior was classified in terms of current smoker, ex-smoker, or nonsmoker. A current smoker was defined as one who regularly smoked at least one cigarette per day, an ex-smoker was one who had given up smoking for at least 6-months, and nonsmoker was one who had never smoked regularly. Hormonal disorders were defined as the infrequent menstruation in women and mental disorders in men. Patients were classified as physically inactive if they reported not participating in walking, cycling or walking for at least 30minutes/day. Height and weight were measured using standardized methods; all the participants wore light clothes and no shoes for this part of the examination. The BMI was calculated as the weight in kilograms (with 1 kg subtracted to allow for clothing) divided by height in meters squared. Subjects were classified into 3 categories: acceptable weight, BMI <25; overweight, BMI 25-29.9; and obese, BMI >30, in accordance with the classification described by Bray.¹³ Blood pressure measurement was carried out by trained practical nurses according to World Health Organization (WHO) standardized criteria.¹⁴ These nurses were trained for one week on the use of the sphygmomanometer and the technique for measuring blood pressure with the patient in the sitting position. Systolic blood pressure (SBP) was recorded at the appearance of the first Korotkoff sound and diastolic blood pressure (DBP) at the disappearance of the fifth Korotkoff sound. The mean value obtained from 3 readings was used in the analysis. Hypertension was defined according to WHO criteria as SBP >140 mm Hg or DBP >90 mm Hg or the use of antihypertensive medication,¹⁴ or both.

The data were analyzed using the statistical packages for social sciences (SPSS).¹⁵ Student's t-test was used to find the difference between means of SBP and DBP among hypertensive and nonhypertensive subjects. The chi-square test was used to compare frequencies between hypertensive and nonhypertensive patients and the frequency of other associated socioeconomic and lifestyle factors. Stepwise logistic regression analysis was used to predict potential confounders and order. The importance of risk factors (determinant) for hypertension. The level $p < 0.05$ was taken as the cutoff value for significance.

Table 1 - Socio-demographic characteristics, life-style habits, selected medical condition and cardiovascular risk factors by gender.

Variables	Male n=508	Female n=700	P value
Age group (years)			
<30	80 (15.7)	161 (23)	
30-39	99 (19.5)	193 (27.6)	
40-49	133 (26.2)	152 (21.7)	<0.001
50-59	89 (17.5)	104 (14.9)	
>60	107 (21.1)	90 (12.9)	
Hypertensive	166 (32.7)	222 (31.7)	NS†
Body mass index			
<25 kg/m ² (accepted weight)	151 (31.1)	146 (21.7)	
>25-30 kg/m ² (overweight)	167 (34.4)	223 (33)	<0.001
>30 kg/m ² (obese)	168 (34.6)	306 (45.3)	
Smoking status			
Never smoked	278 (54.7)	603 (86.1)	
Past smoker	120 (23.6)	16 (2.3)	<0.001
Smoker	110 (21.7)	81 (11.6)	
Physical inactivity	249 (50.8)	420 (60.5)	0.001
Medical conditions			
Diabetes mellitus	124 (25.7)	160 (23.3)	NS
Heart disease	54 (11.1)	75 (11)	NS
Kidney problems	20 (4.2)	40 (5.8)	NS
Hormonal disorders	55 (11.2)	127 (18.5)	0.001
Self-reported family history			
Hypertension	211 (41.9)	348 (49.9)	0.006
Heart attack	74 (14.7)	128 (18.3)	NS
Diabetes mellitus	212 (42.1)	339 (48.5)	0.030
Stroke	52 (10.6)	8 (13.1)	NS
Type of oil used in cooking food			
Olive oil	288 (57.4)	389 (55.7)	NS†
Vegetable oil	317 (63.1)	469 (67.1)	NS
Animal fat/butter	141 (28.1)	147 (21)	0.005
Type of food normally eaten daily			
Salty food	277 (55.8)	406 (58.6)	NS
Vegetables	291 (58.2)	425 (61.4)	NS
Fruit	265 (53)	384 (55.5)	NS
Red meat	277 (55.4)	292 (42.2)	<0.001
Fish/chicken	327 (65.4)	400 (57.8)	0.008
Hot beverages			
Arabic coffee	350 (68.9)	482 (69.1)	NS
Turkish coffee	135 (26.6)	134 (19.2)	0.003
Tea	328 (66)	414 (60)	0.039
Nescafe	148 (29.6)	198 (28.7)	NS
NS † - not significant			

Table 2 - Distribution of selected cardiovascular risk factors and life style habits among hypertensive and normotensive patients.

Variables	Hypertensive n=388	Normotensive n=820	P value
Age group (years)			
<30	22 (5.7)	219 (26.7)	
30-39	59 (15.2)	233 (28.4)	
40-49	108 (27.8)	177 (21.6)	<0.001
50-59	90 (23.2)	103 (12.6)	
>60	109 (28.1)	88 (10.7)	
Gender			
Male	166 (42.8)	342 (41.7)	NS†
Female	222 (57.2)	478 (58.3)	
Body mass index			
<25kg/m ² (accepted weight)	72 (19.4)	225 (28.6)	0.0005
25-30kg/m ² (overweight)	118 (31.6)	272 (34.6)	†NS
≥30 (obese)	184 (49.2)	290 (36.8)	<0.0001
Smoking status			
Never smoked	291 (75)	590 (72)	
Past smoker	43 (11.1)	93 (11.3)	NS
Smoker	54 (13.9)	137 (16.7)	
Physical inactivity	156 (41.3)	359 (44.5)	NS
Medical conditions			
Diabetes mellitus	262 (68.9)	22 (2.8)	<0.001
Heart disease	78 (20.6)	51 (6.5)	<0.001
Kidney problems	24 (6.4)	36 (4.5)	NS
Hormonal disorders	79 (20.8)	103 (12.9)	<0.001
Self-reported family history			
Hypertension	138 (35.8)	421 (51.7)	<0.001
Heart attack	64 (16.5)	138 (16.9)	NS
Diabetes mellitus	163 (42.2)	388 (47.5)	NS
Stroke		96 (12.2)	NS
Type of oil used in cooking food			
Olive oil	44 (11.8)	470 (57.7)	†NS
Vegetable oil	207 (53.6)	573 (70.3)	<0.001
Animal fat/butter	213 (55.2)	171 (21)	0.001
Type of food normally eaten daily			
Salty food	213 (56.1)	470 (58.1)	NS
Vegetables	225 (58.6)	491 (60.8)	NS
Fruit	206 (53.6)	443 (54.8)	NS
Red meat	162 (42.2)	407 (50.4)	0.009
Fish/chicken	217 (56.5)	510 (63.1)	0.031
Hot beverages			
Arabic coffee	284 (73.2)	548 (67)	0.033
Turkish coffee	101 (26)	168 (20.6)	0.038
Tea	215 (56)	527 (65.6)	0.002
Nescafe	108 (28.1)	238 (29.6)	NS
NS † - not significant			

Table 3 - Results of stepwise logistic regression analysis for hypertension as associated with significant characteristics of patient attending primary health care clinics in Qatar.

Independent variables	Odds ratio	95% confidence interval	Significance (p value)
Diabetes Yes=1 No=2	26.68	13.15 - 54.18	<0.0001
Hormonal problems Yes=1 No=2	2.84	1.67 - 4.84	0.0001
Animal fat/butter Yes=1 No=2	2.70	1.68 - 4.83	<0.0001
Heart disease Yes=1 No=2	2.63	1.36 - 5.12	0.0041
Obesity (body mass index>30) >30=1 >30=2	1.75	1.05 - 2.91	0.03037

Results. The overall response rate was 80.5%. Of the total number of patients surveyed, 42.1% were males and 57.9% females. The mean \pm SD age (in years) for males versus females was (45.7 \pm 14.6 and 41.3 \pm 13.1; $p < 0.001$). **Table 1** shows socio-demographic characteristics and the distribution of lifestyle habits, cardiovascular risk factors, and family history by gender. Overall, the prevalence of hypertension (BP ≥ 140 or ≥ 90 mm Hg, or both, or known hypertensive) was 32.1% (32.6% in men and 31.7% in women). The age-standardized prevalence of hypertension (adjusted to the adult population of Qatar) was 31.1% (95% confidence interval 26.7–35.5%) in men and 30.2% in women (95% confidence interval 25.8–34.6%). There was no significant difference in the prevalence of hypertension among men versus women. A total of 508 subjects were found to be hypertensive, comprising 166 men and 222 women. The CVD risk factor of obesity was more prominent among women (78.3%) than among men (68.9%) ($p < 0.001$). Physical inactivity was again predominant among women and found to be highly significant. Smoking was found to be more common among men ($p < 0.001$). We also observed that a self-reported family history of hypertension ($p = 0.006$) and DM ($p = 0.030$) was more common among women. The selected cardiovascular risk factors and life style habits among hypertensive and normotensive patients are presented in **Table 2**. There are statistically significant differences between age group of hypertensive and normotensive subjects ($p < 0.0001$). It can also be seen that obesity is considerably higher among hypertensive subjects ($p < 0.001$). Medical complications such as DM (68.9%; $p < 0.001$), heart disease (20.6%; $p < 0.001$) and hormonal disorders (20.8%; $p < 0.001$) are prominent among hypertensive subjects. A stepwise logistic regression analysis was used to adjust for potential confounders and to order the importance of risk factors (determinant) for hypertension (0 for nonhypertensive and 1 hypertensive) (**Table 3**). The logistic regression model was adjusted for age and gender. As can be seen from **Table 3**, diabetes ($p < 0.0001$); hormonal problems ($p < 0.0001$), the ingestion of animal fats ($p < 0.0001$), heart disease risk ($p = 0.0041$), and obesity ($p = 0.0307$) were considered as associated risk factors for hypertension.

Discussion. To our knowledge, there are no population-based studies that have examined the prevalence of hypertension and its associated CVD risk factors in Qatar. In order to implement effective preventive strategies and achieve a considerable reduction in the prevalence of CVD, knowledge of the epidemiology of hypertension and the effects of

sociodemographic, economic, and behavioral factors is essential. A good response rate was obtained in this cross-sectional study (80.5%), which shows a very high prevalence of hypertension (32.1%) in Qatar: 32.7% among men and 31.7% among women. These figures are higher than those of earlier studies carried out in other countries; such as Hungary (20–24%),⁷ Canada (21%),³ Greece (28.4%),⁴ and Germany (20%),¹⁶ and China (28%).⁵ However, studies conducted in Russia showed results similar to those obtained in Qatar (36%).⁶ This high prevalence of hypertension is probably due to the particular eating, drinking, and behavioral habits of the Qatari people. The low level of health awareness is another factor that has contributed to Qatar's leading position in CVD mortality.⁷ A few studies have demonstrated the proportions of poorly treated versus well-controlled hypertensive patients. It has also been found that a very low percentage of hypertensive measure monitor their blood pressure regularly. In our sample, 11% of those who had hypertension were not aware of it. These data emphasizes the importance of more effective prevention and health education programs and campaigns for the early recognition and better control of hypertension. Overweight, little physical activity, the excessive ingestion of saturated fats, and smoking were positively associated with hypertension. A determination of which social class is associated with the greatest likelihood of becoming hypertensive is crucial as the public health system is unable to conduct general nationwide screening projects.¹⁷⁻¹⁸ The screening programs for high risk persons should be cost-effective and be productive of good results. In our study, low educational level, female gender, advanced age, predominantly sedentary work were independent risk factors for hypertension, concurrently with smoking and obesity. These findings are consistent with previous reports showing an inverse relationship between socioeconomic status and cardiovascular risk factors.^{3-7,17-21} Hypertension is associated with an atherogenic cardiovascular risk profile, as reflected by overweight. This result is not unexpected in light of previous studies:^{2-7,9} indeed, the association we found can probably be considered a manifestation of the multiple metabolic syndrome.¹⁷ Among those participating in this study, 15.8% were current smokers and 11.2% past smokers. Interestingly, a current smoking habit was less frequent among hypertensive individuals. This unexpected finding may be due to education and smoking prevention programs. Probably hypertensive subjects are more responsive to such programs and therefore give up smoking more easily. This trend is reflected by the total of 11.1% of ex-smokers among hypertensive individuals in our study.

In summary, the present study was directed at determining the prevalence and risk factors of high BP in the adult population of Qatar. The characterization of these factors will contribute to defining more effective and specific strategies to screen for hypertension and CVD risk factors and to bring them under control.

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