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URN Effect of Hypertension on Acute Myocardial Infarction: A Cross-cultural Comparison

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Abstract: Cardiovascular disease (CVD) is the leading cause of mortality and morbidity in many of the affluent Arab nations. The incidence of acute myocardial infarction (AMI) and hypertension is also rising rapidly.The aim of this study is to assess the effect of hypertension among the Qatari and Non Qatari patients admitted to hospital in Qatar with Acute Myocardial Infarction (AMI).This is a retrospective cohort study.Hamad General Hospital, Hamad Medical Corporation.All Qatari and Non Qatari patients who were hospitalised with AMI with or without hypertension in the Hamad General Hospital, State of Qatar from 1991 to 2002. Overall 22,440 patients (40% were males vs 60% were females) admitted during a period of twelve years.The Diagnostic classification of definite AMI was made in accordance with criteria based on the International Classification of Disease tenth revision (ICD-10). The obtained information was based on the following parameters: the age at the time of admission, gender, cardiovascular risk factor profiles (smoking status, hypercholesterolemia, diabetes, and pre-existing coronary heart disease), and ECG AMI location. We have also studied the trend of in-hospital mortality, morbidity and acute medical care provided. Data analysis were performed using stepwise logistic regression analysis. Of the total 22,440 patients, 8976 (40%) were Qatari's and 13,464 (60%) were non-Qatari's. Out of total sample, 5390 (24%) patients admitted with AMI. Qatari's with AMI were 1598 and 601 among them were hypertensive and Non Qataris with AMI were 3792 and 826 among them were hypertensive. Also, the incidence of hypertension was slightly higher in females than in males both among the Qataris 41.1% vs. 20.5% $p<0.001$ and among the Non Qataris 13.0% vs. 3.2%. Hypertension cases were rising sharply with increasing age ($p<0.001$) among the Qataris. The results of stepwise logistics regression analysis showed that there was a statistically significant association between AMI and gender, diabetes, hypercholesterolemia, shortness of breath and smoking.The present study revealed that there is a strong association between AMI, hypertension, DM and other CVD risk factors, indicating the importance of the need for more effective prevention programs and control of hypertension and AMI.

Key words: Epidemiology, hypertension, Acute Myocardial Infarction (AMI), trend, gender, ethnicity, mortality, morbidity

INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of mortality and morbidity[1] and the incidence of acute myocardial infarction (AMI) is rising rapidly in many of the affluent Arabian Gulf Countries especially in Qatar[2-3].

Hypertension is the most common risk factor for CVD[3-8] and other risk factors, such as obesity, diabetes mellitus (DM) and smoking, are also higher among hypertensive people than non-hypertensives[2-12]. More recently, Bener *et al*.[3] reported that hypertension was a predictor of congestive heart failure. Furthermore, some studies have indicated that pulse pressure may be a very important predictor of cardiovascular events[1-3-8,11].

The aim of this study is to assess the effect of hypertension among the Qatari and Non Qatari patients admitted to hospital in Qatar with Acute Myocardial Infarction (AMI).

MATERIALS AND METHODS

The estimated population of the State of Qatar for the year 2003 was 724,125. Approximately 30% of the population were Qatari nationals and the rest were expatriates, mostly from the Middle East, South Asia and South East Asia[2].

The database of the Coronary Care Unit at the Hamad General Hospital, Hamad Medical Corporation was used

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for this study. This hospital provides comprehensive tertiary health care services for all patients with AMI, angina and congestive heart failure requiring hospitalisation are treated at this hospital. With the described database, all inpatients diagnosed with AMI during the twelve-year period from January 1991 to December 2002 were identified. Overall 22,440 patients (40% were males vs 60% were females) admitted to the Coronary Care Unit and cardiology wards of Hamad General Hospital during a period of twelve years. Of the total, 8976 (40%) were Qatari's and 13,464 (60%) were non-Qatari's. Out of total sample, 5390 (24%) patients admitted with AMI. The diagnostic classification of definite AMI cases was made according to the criteria recommended by Gillum *et al*.[11] and other[12].The age of presentation, gender, cardiovascular risk factor profiles (smoking status, hypercholesterolemia, diabetes and pre-existing coronary heart disease), electrocardiography (ECG) and location of AMI were analyzed. Hypertension was defined according to WHO criteria[13] as SBP > 140 mm Hg and/or DBP > 90 mm Hg and or the use of antihypertensive medication. The presence of DM was determined by the documentation in the patient's previous or current medical record of a documented diagnosis of DM that had been treated with oral medications or insulin. The presence of hyperlipidemia was determined by the demonstration of a fasting cholesterol > 200 mg/dL[1] in the patient's medical record, or any history of treatment for hyperlipidemia by the patient's physician.Data are expressed as mean ± Standard Deviation (SD) unless otherwise stated. Chi-square analysis was performed to test for differences in proportions of categorical variables between two or more group's. In 2x2 tables, the Fisher exact test (two-tailed) was used instead of Chi-Square, particularly, when sample size was small. Stepwise logistic regression analysis was used to predict risk factors (determinant) for the AMI. The level $p<0.05$ was considered to be the cut-off value for significance.

RESULTS

Overall 22,440 patients (40% were males vs 60% were females) admitted to the Coronary Care Unit and cardiology wards of Hamad General Hospital during a period of twelve years. Of the total, 8976 (40%) were Qatari's and 13,464 (60%) were non-Qatari's. Out of total sample, 5390 (24%) patients admitted with AMI.

Table 1 shows the comparison between Qatari and Non Qatari patients with and without hypertension. Among the total Qatari patients (1,598) admitted with AMI and 37.6% of them were with hypertension. Also the prevalence of hypertension was higher in Qatari males $p<0.001$ and among Non Qataris the females were more

Table 1: Baseline clinical characteristics and biochemical profile of MI by the presence and absence of hypertension among Qatari's and Non-Qatari's.

	Qatari's		Non Qatari's	
Variables	Hypertension (n=601)	Non Hypertension (n=997)	Hypertension (n=826)	Non Hypertension (n=2966)
Gender				
Male	354(58.9)*	793(79.5)	719(87.0)*	2871(96.8)
Female	247(41.1)	204(20.5)	107(13.0)	95(3.2)
Age group				
<60	211(35.1)	494(49.5)	645(78.1)	2621(88.4)
=60	390(64.9)	503(50.5)	181(21.9)	345(11.6)
Smoking habits				
Yes	178(28.6)*	423(43.3)	469(18.4)*	357(28.8)
No	444(71.4)	553(56.7)	2085(81.6)	881(71.2)
History				
Angina	307(51.1)	489(49.0)	499(60.4)	1712(57.7)
Dizziness	8(1.3)	12(1.2)	7(0.8)	27(0.9)
Palpitation	7(1.2)	14(1.4)	8(1.0)	19(0.6)
Atypical chest pain	11(1.8)	15(1.5)	12(1.5)	44(1.5)
Shortness of breath	157(26.1)*	128(12.8)	77(9.3)*	141(4.8)
Complications				
Diabetes mellitus	391(65.1)*	472(47.3)	319(38.6)*	684(23.1)
Hypercholesterolemia	172(28.6)	251(25.2)	233(28.2)‡	711(24.0)
Angina	38(6.3)†	35(3.5)	40(4.8)†	82(2.8)
CHF	145(24.1)*	143(14.3)	65(7.9)‡	168(5.7)
Old MI	105(17.5)	147(14.7)	87(10.5)‡	241(8.1)
Coronary artery bypass graft	21(3.5)	41(4.1)	30(3.6)‡	67(2.3)
Laboratory data				
Total cholesterol	5.35±1.23	5.44±1.29	5.49±1.24	5.37±1.24
HDL – cholesterol	1.23±0.52	1.12±0.52	1.09±0.45	1.16±0.72
Triglyceride	1.75±0.96	1.96±1.66	2.19±1.79	2.14±1.51
CPK	719.4±490.6	713.7±492.6	746.9±489.2	847.1±531.6

* $p<0.001$; †$p<0.01$; ‡$p<0.05$

Table 2: Mode of therapy and inpatient mortality of AMI patients in the presence of hypertension by ethnicity

	Qataris		Non Qataris	
Variables	Hypertension	Non Hypertension	Hypertension	Non Hypertension
Thrombolysis	100(16.6)*	314(31.5)	332(40.2)*	1616(54.5)
Drugs administered during admission				
Aspirin	436(72.5)	754(75.6)	694(84.0)	2565(86.5)
Beta blockers	119(19.8)*	284(28.5)	305(36.9)‡	1239(41.8)
Ace inhibitors	206(34.3)*	174(17.5)	171(20.7)*	347(11.7)
Calcium channel blockers	86(14.3)	120(12.0)	88(10.7)*	211(7.1)
In-hospital complications				
Stroke	9(1.5)	16(1.6)	5(0.6)	16(0.5)
Heart block	18(3.0)	49(4.9)	26(3.1)	96(3.2)
Shock	38(6.3)	73(7.3)	25(3.0)	104(3.5)
Death	107(17.8)	162(16.2)	63(7.6)	198(6.7)

* p<0.001; †p<0.01; ‡p<0.05

Table 3: Stepwise logistic regression analysis to identfy predicatiors of acute myocardial infraction

Independent veriable	Odds ratio (OR)	95%Confidence interval (95% Cl)	P-value significance
Hypercholesterlemia	2.04	1.87-2.23	<0.001
Sex	1.91	1.72-2.12	<0.001
Smoker	1.72	1.59-1.86	<0.001
Shortness of breath	1.65	1.31-2.08	<0.001
Diabetes mellitus	1.52	1.40-1.64	<0.001

likely to be hypertensive 13.0% vs. 3.2% , p<0.001. Smoking habits among the Qatar were highly significant among the Qatari as well as among the Non Qataris. Current smokers are higher among the non hypertensive groups. History of angina, dizziness, palpitation and atypical chest pain did not show any significant difference among the hypertensive and non hypertensive groups of Qataris and non Qataris. However shortness of breath was significantly twice as high among hypertensive subjects among the Qataris as well as non Qataris with p<0.001 in each case. Complications like diabetes, angina, CHF were significantly higher among the hypertensive subjects and the prevalence of the disease was much higher among the Qataris than the Non Qataris. The prevalence of diabetes and CHF was twice as much as in Qataris than Non Qataris.

Table 2. represents the mode of therapy and inpaitent mortality of AMI subjects. The procedure thrombolysis was significantly higher among the non hypertensive subjects both in Qataris and Non Qataris groups. Beta-blockers was significantly more likely to be given to non hypertensive subjects during admission and Ace Inhibitors on the other hand was more likely to be administered on hypertensive subjects in the Qatari and Non Qatari categories.

Table 3 presents the results of stepwise logistics regression analysis to identify factors independently associated with AMI in-hospital outcome. It is clear from the table that there was a significant association between AMI and sex, smokers, diabetes mellitus, shortness of breath and hypercholesterolemia after adjusting for age and other variables.

DISCUSSION

CVD is the leading cause of mortality and morbidity[1]and the incidence of AMI is rising rapidly in many developed and developing countries[1-13]. It is worth noting that if we wish to achieve a significant reduction in the prevalence of CVD, it will be essential to adopt effective preventive strategies. In addition, knowledge of the epidemiology of hypertension and the effects of socio-demographic, economic and behavioral factors on the prevalence of hypertension and CVD risk factors is significantly important and equally necessary[2-6,8,9].

This study in an urban population in early epidemiological transition shows a high prevalence of hypertension in AMI patients particularly after the age of 50 years. The prevalence of hypertension is highly dependent on the definition used and the age distribution of the population studied. This is the first comprehensive cross-sectional hospital based survey for studying the effect of hypertension, DM and Hypercholesterolemia among Qatari AMI patients. High rates of hypertension were found among Qatari population, which is consistent with the results of studies conducted in developed and other countries [1,4,7,8,10,13-16]. The effect of hypertension on AMI has been documented by several studies[1-10,13-16]. Their study findings are consistent with the present study outcome results.

Comparison of hypertension between males and females with respect to age has been reported in previous studies; these had shown that younger men have higher blood pressure than younger women and older men have lower blood pressure than older women in most populations[2-4, 7,8,10]. This is consistent with the present study conducted in Qatar[2-7, 8] and other surveys carried out in the United States[6] and in the French population[10].

The efficacy of lifestyle-modification for preventing hypertension is very essential[2,9] for reducing blood pressure and other risk factors under practical conditions. However, lifestyle-modification programs

can be implemented in Arabian Gulf countries and improve such cardiovascular risk factors such as hypertension and obesity.

STUDY LIMITATIONS

The major limitation of our study was its retrospective analysis of a prospective registry. Second, our study probably underestimated the true prevalence of hypertension and DM, since systematic screening is not routinely performed in our patients. Third, there were insufficient data on socio-economic and life-style habits associated with hypertension.

CONCLUSION

The present study revealed that there is a strong association between AMI, hypertension, DM and other CVD risk factors, indicating the importance of the need for more effective prevention programmes and control of hypertension and AMI.

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