Management of Coronary Artery Disease in Jordan: Cross-Sectional Comparative Study

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ABSTRACT

Patients with Coronary Artery Diseases (CAD) are at the top priority for preventive cardiology, since secondary prevention markedly reduces cardiovascular mortality. This study aims to determine how many of Jordanian CAD patients have reached the treatment targets of their cardiovascular risk factors, and to compare our data with internationally published studies. A cross-sectional observational study was conducted between December 2003 and April 2004 in randomly selected outpatient clinics where patients with CAD were treated. One hundred and twenty physicians participated (67.8% response rate), and 262 CAD patients were included in this study. The study revealed high prevalence of smoking (22.1%), overweight (51%), obesity (29.7%) and physical inactivity (51%) among Jordanian patients with CAD. The adverse lifestyle trends and the finding that the majority of patients did not achieve their blood pressure (73.8%), cholesterol (71.6%) and fasting plasma glucose (62%) targets are causes of concern. Patients' gender was the major factor influencing the outcomes of this study. This treatment gap compares well with the international studies conducted in United States, Europe, and Australia.

Keywords: Jordan, Coronary artery disease, Risk factors, Secondary prevention.

List of Abbreviations

CAD: Coronary Artery Disease; **BP**: Blood Pressure; **FPG**: Fasting Plasma Glucose; **FBG**: Fasting Blood Glucose; **TC**: Total Cholesterol; **LDL-C**: Low Density Lipoprotein Cholesterol; **HDL-C**: High Density Lipoprotein Cholesterol; **TG**: Triglyceride; **HTN**: Hypertension; **DM**: Diabetes Mellitus; **MI**: Myocardial Infarction; **CR**: Coronary Revascularization; **PCI**: Percutaneous Coronary Intervention; **CABG**: Coronary Artery Bypass Grafting; **ACC/AHA**: American College of Cardiology/American Heart Association; **ADA**: American Diabetes Association; **NHLBI**: National Heart, Lung and Blood Institute; **NCEP-ATP III**: National Cholesterol Education Program Adult Treatment Panel III; **JNC-7**: Joint National Committee-7; **TJTF**: Third Joint Task Force of European and other Societies on Cardiovascular Disease Prevention; **GP**: General Practitioner; **BMI**: Body Mass Index

INTRODUCTION

Coronary Artery Disease (CAD) is a leading cause of morbidity and mortality among adults world wide and in Jordan[1, 2]. Proper control and when possible, reduction of modifiable risk factors such as smoking, obesity and physical inactivity are among the main objectives in the management of CAD[3, 4]. Additionally, it is necessary to treat promptly co-morbid conditions such as Hypertension (HTN), Diabetes (DM) and Dyslipidemia[3-8]. Although the

mainstay of treatment is pharmacological, lifestyle changes are equally important, particularly smoking cessation, weight loss, increased physical activity, and dietary control[3, 4, 7]. Advances in secondary prevention of CAD had contributed significantly to the decline in cardiovascular mortality in the past decade[9, 10]. Clinical practice guidelines for the management of CAD, which are based on the results of large randomized controlled trials, have been developed and disseminated[3, 4, 8]. Still, several studies have found that patients with CAD are under-treated[9-13], although there is improvement over time[9,10]. Moreover, Blood Pressure (BP), Fasting Plasma Glucose (FPG) and lipid goals are not achieved in a significant fraction of the population studied; this is also true in regard to adverse lifestyle trends[9-11]

The objectives of this research is to determine the proportion of Jordanian outpatients with established CAD who achieve their modifiable risk-factor targets as recommended by the American College of Cardiology/American Heart Association (ACC/AHA)[3], American Diabetes Association (ADA) [5,14], National Heart, Lung and Blood Institute (NHLBI) (JNC-7[6] and NCEP-ATPIII)[7,15], and the Third Joint Task Force of European and other Societies on Cardiovascular Disease Prevention (TJTF)[4] and to compare results with international studies, where available, conducted in Europe [(EUROASPIRE II)[9], (ASPIRE)[12], and Switzerland[11], Australia (VIC-II)[10], and United States (L-TAP)[13]. This is important since recent studies conducted in Jordan indicated high prevalence of risk factors among the general public[16-19].

METHODOLOGY

A cross-sectional observational study was conducted in stratified and randomly selected out-patient clinics between December 2003 and April 2004. Physicians in-charge were handed covering letters explaining the purpose of the study, and assuring the confidentiality of information. Once in the clinic, field workers would ask CAD patients to consent to participate in the study. The target number was 2 to 3 patients per clinic. The

physicians who agreed to participate in the study had to fill a questionnaire. The physicians-reported information was checked against information from patients' interviews and from medical files. The research proposal was approved by the Deanship of Scientific Research (The University of Jordan, Jordan) and "Academic and Professional Committee" at Jordan University Hospital.

A) Sampling Frame

The study was applied to adult patients aged 18 and over, who were attending outpatient clinics and who were diagnosed with CAD for a duration of at least 1 year, including patients with: chronic stable angina; prior myocardial infarction (MI); prior revascularization (Percutaneous Coronary Intervention (PCI) and Coronary Artery Bypass Graft (CABG)); angiographically proven coronary atherosclerosis; and reliable noninvasive evidence of myocardial ischemia. The study excluded patients with valvular heart diseases and any other non-atherogenic causes of angina. Because the study was conducted in outpatient setting, the study did not include any patients with acute ischemic syndrome, or patients who were undergoing Coronary Revascularization (CR).

B) Sampling Procedure

The "Jordanian Medical Association" maintains an updated registry of all physicians. By December 2003, there were 15,000 registered physicians, including 698 internists, 91 cardiologists, 41 endocrinologists, and 10,488 General Practitioners (GP). The number of practicing licensed physicians was 8400. Internists, cardiologists, endocrinologists and general practitioners were included in the study. The physicians were stratified based on their specialties, and then a total of 180 were randomly selected. There were no differences in the questionnaire administered to physicians of different specialties.

C) Questionnaire Components

The survey consisted of four parts. The first part included physicians' names, specialties, and working places. The second part reported patients' height, weight, gender and age, while the third part composed of patients' personal and family history of CAD, and patients' other medical problems. The last part recorded

recent vital signs and lab results.

D) Risk Factors

The definitions of risk factors were as follows:

Obesity was defined as body mass index (BMI) ≥ 30 but less than 40 kg/m^2, and overweight was defined as BMI ≥ 25 but less than 30 kg/m^2. Current smoking was defined as smoking at least one cigarette/day or water-pipe up to one month before enrollment. Hypertension was defined as prior diagnosis by a physician, or known BP values > 140/90 mmHg (non diabetics) or > 130/80 mmHg (diabetics)[6] on more than 2 occasions. The use of BP lowering medications was not utilized to define HTN. Diabetes was defined as prior diagnosis by a physician, known FPG values > 126 mg/dl (7 mmol/l), or current use of hypoglycemic medication. Dyslipidemia was defined as prior diagnosis by a physician or the presence of one or more of the followings: low density lipoprotein cholesterol (LDL-C) > 100 mg/dl (2.6 mmol/l)[7,15], high density lipoprotein cholesterol (HDL-C) < 40 mg/dl (1.03 mmol/l), or triglycerides (TG) > 150 mg/dl (3.89 mmol/l), measured after > 8 hr fasting. The use of lipid lowering medications was not utilized to define dyslipidemia.

D) Statistical Analysis

All data were entered and analyzed using the SPSS$^©$ software (version 11.0; SPSS, Inc, Chicago, IL). In this paper, percentages are expressed to the actual data obtained, and missing data are not counted. Chi square ($\chi 2$) and Fisher exact tests were used to test any significance between categorical variables whereas independent t-test was utilized with non-categorical variables. All P-values were two-sided and P < 0.05 was considered statistically significant.

RESULTS

A) Physicians' Characteristics

The total number of licensed practicing physicians that were approached and agreed to participate was 120/180 (66.7%). The majority of physicians were cardiologists (44%), and internists (35%) and the remaining were general practitioners (16%) and

endocrinologists (5%). The main reason offered by physicians for not participating was that they were not treating any CAD patients. There was no statistical difference between respondents and non-respondents with regard to age, gender and location.

B) Patients' Characteristics

All 262 patients approached (100%) agreed to participate in the study. Table 1 summarizes patients' characteristics. Patients had an average age of 57.6 years (range 31-80 years) and 70% were men. One third of CAD patients (33.6%) had first degree relatives diagnosed with CAD, and 14% had definite MI or sudden death in first degree relatives. Almost half of the patients (54%) had history of MI and 61% underwent CR. CABG accounted for 30% of patients who underwent CR, while 70% had angioplasty. Two thirds (66%) of patients were admitted to hospitals because of CAD within the last 12 months.

C) Life Style Risk Factors

C-1) Smoking

The prevalence of self-reported current smoking among Jordanian CAD patients was 22.1% (45/204) (Table 2). The remaining CAD patients were either "never smoked" (76, 37.3%), "quitted < 1 year" (26, 12.7%) or "quitted > 1 year" (57, 27.9%). The self-reported current smoking was significantly more prevalent in men CAD patients than women (40/149 (26.8%) VS 5/55 (9.7%), p < 0.01) (Figure 1). Age of Jordanian CAD patients was also playing a role in smoking, but to a lesser extent than gender (<50 years: 17 (33.3%), 50-59 years: 11 (20.4%), >60 years: 17 (17.2%), p < 0.1).

C-2) Abnormal Body Weight And Physical Inactivity

The average body mass index (BMI) of Jordanian CAD patients was 28.7 (± 5.3) kg/m^2 with 80.7% (201/249) had abnormally high body weight (BMI ≥ 25 kg/m^2), 29.7% (74/249) suffered from obesity (BMI ≥ 30 kg/m^2) (Table 2), 51% (127/249) were overweight (30 kg/m^2 > BMI ≥ 25 kg/m^2) and 51% (122/240) admitted physical inactivity (< 30 min/day for 3 days or more/week). It was noted that obesity was more prominent among Jordanian women with CAD (women:

33 (42.9%) VS men: 41 (23.8%), p<0.005) (Figure 1) and among diabetics (DM: 55/154 (35.7%) VS non-DM: 19/95 (20%), p<0.01). There was no statistically significant difference between different BMI categories and patients' age or other patients' characteristics.

D) Diseases Associated With Development of CAD

D-1) Hypertension and BP

In the current study 259 out of 262 patients (98.9%) had their BP measured in their last visit to their clinics. 226 (86.3%) of these patients were diagnosed with HTN (Table 2). HTN was prevalent among diabetics (DM: 154/165 (93.3%) VS non-DM: 72/97 (74.2%), p=0.000). The average systolic BP was 139 (± 21.8) mmHg and the average diastolic BP 85 (± 11) mmHg. Half of CAD patients (123, 47.5%) had their systolic BP ≥ 140 mmHg and 108 (41.7%) had their diastolic BP ≥ 90 mmHg. The number of patients with systolic BP ≥ 140 mmHg or diastolic BP ≥ 90 mmHg was 137 (52.9%) (Table 3). Independent t-test analysis indicated significant difference in average systolic BP between CAD obese patients (142 ± 19 mmHg) and CAD patients with normal BMI (133 ± 23 mmHg) (p<0.05). The guidelines of JNC-7 [6] and ADA [5,14] recommend that the BP targets for non-diabetics to be less than 140/90 mmHg, and for diabetics to be less than 130/80 mm Hg. Almost three quarters (191, 73.7%) of Jordanian CAD patients did not reach their BP targets (Table 3). This JNC-7-defined treatment gap was more pronounced in diabetics (DM: 133 (82.1%) VS non-DM: 58 (59.8%), p<0.001) and in women (women: 66 (84.6%) VS men: 125 (69.1%), p<0.01) (Figure 1).

D-2) Diabetes and FPG

The overall prevalence of diagnosed DM in Jordanian CAD patients was 63% (165/262) (Table 2). Prevalence of DM among CAD patients was influenced mostly by: age (< 50 years (30, 47.6%), 50-59 years (50, 71.4%), > 60 years (85, 65.9%), p < 0.01); and gender (men (105, 57.4%), women (60, 75.9%), p < 0.005) (Figure 1). The proportion of CAD patients who had their FPG checked by their physicians was only 41.2% (108/262); 57% (94/165) of diabetic patients and 14.4% (14/97) of non-diabetics.

The average FPG among CAD patients (n=108) was 152 (± 54) mg/dl (8.4 mmol/l). Almost two thirds (67, 62%) of CAD patients did not reach the desired FPG target as determined by ADA (FPG <130 mg/dl (7.2 mmol/l)), all of them were diabetics (Table 3). Jordanian CAD patients who had history of MI (23 (46%) VS 44 (75.9%), p<0.001), and who were hospitalized because of CAD (39 (54.2%) VS 28 (77.8%), p<0.05) had lower FPG treatment gap. None of the parameters studied was statistically influenced by type of diabetes.

D-3) Dyslipidemia, LDL-Cholesterol and Total Cholesterol

The prevalence of diagnosed dyslipidemia among Jordanian CAD patients was 74.4% (195/262). Dyslipidemia was equally prevalent across different age groups and among men and women. Interestingly, dyslipidemia was more prevalent among CAD patient who underwent CR (128/159 (80.5%) VS 66/102 (64.7%), p<0.005). The number of patients who had at least one lipid parameter measured was 226 (86.3%), of those 27 had only one lipid parameter measured; 9 had only two lipid parameters measured; and 190 had three parameters measured. The lipid parameters that where examined the most were: TC, LDL-C, and HDL-C. The percentage of CAD patients who had their TC, LDL-C, and HDL-C measured were 85.9% (225/262), 75 % (197/262), and 73.7% (193/262), respectively. The average level of LDL-C was 126.4 (±47) mg/dl, HDL-C was 39.9 (±9.6) mg/dl, and TC was 211.8 (±57) mg/dl. The number of patients who did not achieve their LDL-C target (<100 mg/dl) was 141 (71.6%) (Table 3). Treatment gap for TC level < 193 mg/dl was 54.7% (123/225); treatment gap for TC level < 174 mg/dl was 74.7% (168/225); and treatment gap for TC < 154 mg/dl was 87.6% (197/225) (Table 3).

DISCUSSION

According to current research significant number of Jordanian CAD patients did not reach their management target levels as determined by internationally recognized guidelines; ACC/AHA[3], TJTF[4], ADA[5,14], JNC-7[6]. The

study revealed high prevalence of smoking (22.1%), overweight (51%), obesity (29.7%), physical inactivity (51%), poor control of BP (73.8%), lipid parameters (71.6%) and FPG (62%) (Tables 2 and 3). The results compare well with CAD patients who were studied in United States[13], Europe[9,11,12], and Australia[10]. The most striking difference from other countries is the unusually high prevalence of DM (63% VS (17.5-23.6%)) (Table 2) and HTN (86.3% VS (62.6-65%)) (Table 2) among Jordanian patients with CAD. This difference may be attributable to 5 major factors. First: the already high incidence of HTN and DM among the general public especially among those that age-match CAD patients (Table 4). It is despairing that the prevalence of DM and HTN among Jordanian general public aged > 45 years is comparable to CAD patients who were studied in other countries (Tables 4 and 2). Second: it was observed that sampled CAD patients with DM had significant clustering of CAD risk factors, where they had higher level of obesity (35.7% VS 20%), higher level of HTN (93.3% VS 74.2%), more pronounced BP treatment gap (82.1% VS 59.8%), and higher average age (59 ± 9 years VS 56 ± 12 years). Results suggest that HTN has to be addressed more aggressively in CAD patients with DM, this is especially true as HTN is one of the complications of DM[5,14]. Third: HTN was defined at lower level for diabetics (BP < 130/80), as compared to other studies ((BP < 140/90). This BP goal cutoff for diabetics was adopted by JNC-7[6], ADA[14] and (TJTF)[4].

Fourth: the higher prevalence of HTN, DM and dyslipidemia is likely to reflect the rising of obesity among Jordanians, although better detection most probably is a contributing factor[9]. A recent study conducted by Ministry of Health revealed that 29%, 85% and 58% of general public never examined their BP, FPG, and lipid profile, respectively[16]. The direct measurement of such parameters revealed an increase in the prevalence of HTN, DM and dyslipidemia among the public[16,18] (Table 2). The findings suggest that the general public in Jordan is unlikely to seek preventive services[17]. Current study found that FPG was the only parameter that was monitored sparsely (41.2%) as

compared to BP (98.9%) and LDL-C (75%). The finding raises concerns as a study revealed that the ratio of patients with diagnosed diabetes to those discovered after measuring FPG was 2:1. The study was sponsored by "Jordan National Centre for Diabetes"[18]. Finally, other factors such as diet and genetic predisposition should not be overlooked as potential causes of the observed incidence of co-morbid medical problems, and thus warrant further researching.

The observed adverse life trends, especially obesity, smoking and physical inactivity are probably a result of rapid economic growth, along profound lifestyle transformation and social changes[18]. It has been postulated[18, 20] that populations who used to live in harsh environment, developed genetically so as to conserve energy which becomes detrimental when food becomes abundant[18]. This may explain the finding that less Bedouins (10.9%)[21] suffered from HTN as compared to modernized Jordanian communities (26%)[16].

The substantial levels of obesity in Jordan, combined with the overall low physical activity among both sexes, reflect the need to increase opportunities for counseling on exercise and nutrition[17,22]. Such counseling by health-care providers can reduce mortality and morbidity burden. Additionally, all patients should be encouraged to increase their levels of aerobic exercise and to incorporate it into their daily routine[23]. Physicians must explain the favorable effects of obesity reduction on blood pressure, lipoprotein profile, and propensity to hyperglycemia[5-7, 19]. This is important as current study indicated significant difference in average systolic BP between obese Jordanian patients with CAD and CAD patients with normal BMI. The same findings were observed among the general public[19]. Unlike other studies[18, 19], current study was not able to detect any significant differences between BMI categories and any of the lipid parameters or FPG. This may be explained by the high prevalence of DM and dyslipidemia among Jordanian CAD patients, and their use of antidiabetics and lipid lowering drugs, where other studies were conducted among apparently healthy individuals[19].

Physicians must highlight the importance of smoking

cessation to all smoking patients[3-7]. The causal link between smoking and premature CAD is well demonstrated[24]. Smoking cessation is the single most important intervention for primary and secondary prevention of CAD[3-5, 24], yet it is the most difficult to address successfully[25]. There is good evidence that physicians and other professionals can help patients to stop smoking[26]. Unfortunately, only 43% of Jordanian smokers had received counseling about smoking.

Unfortunately, none of the participating clinics offered active and structured programs directed to CAD patients to address the need for reducing body weight, increasing physical activity, fostering smoking cessation or initiating cardiac rehabilitation.

Analysis of risk factors and treatment gaps against patients' age, gender, history of MI, CR and hospital stay demonstrated a general homogenous pattern. The factor that influenced the outcomes of this study the most was patients' gender. Women were more likely to be obese, to be diabetic and to have their BP and FPG less controlled (Figure 1). Similar influence of gender on the prevalence of obesity[16, 17] and diabetes[17, 18] was observed among the general public. The social norms discourage women from leaving their residential places, or to exercise publicly and encourage them to take care of their kids and husbands on the expense of themselves. On the other hand women had lower incidence of reported smoking. The low prevalence of smoking among Jordanian women with CAD probably reflects cultural norms that dissuade women from starting to smoke[17]. Similar findings were observed among general population of Jordan (men (50.5%-51%), women (7%-8.3%))[16, 17] and among European patients with CAD[9].

Although the results of this study are disappointing, it indicates considerable potential for improvement. Although no studies were conducted to reveal benefits from risk reduction among Jordanian in particular, results of this study should raise the standards of preventive cardiology by stimulating the development of national guidelines, their dissemination, and

implementation. Furthermore, any interventional treatment plan should include education, goal setting and follow-up as necessary. Special emphasis has to be directed toward women as they suffer higher incidence of obesity, uncontrolled BP, and uncontrolled FPG.

LIMITATIONS OF THE STUDY

The findings in this paper need to be interpreted within the context of the following potential limitations.

1. We can not exclude the possibility that the management of CAD patients by non-respondents may deviate to some extent from findings of the current study. Though, it should be noted that response rate is consistent with the average response rate to surveys addressing physicians[27].

2. The survey relied on physicians' reports of lab measurements, but no attempts were made to directly measure BP, FPG or lipid profile. Furthermore, non-standardization of measurements may increase the variability of the results.

3. The cross sectional nature of this study limits inferences regarding some of the associations noted.

4. Face-to-face interviews with women might have underreported their smoking habits because of general disapproval of smoking among women in Jordan.

ACKNOWLEDGMENT

Table 1. Patient characteristic of Jordanian patients with CAD in comparison with other studies.

Character	Number/mean (percent/ ±SD)					
	Jordan (2003-2004)	Switzerland[11] (2003)	Europe[9] (1999-2000)	Australia[10] (1999-2000)	USA[13] (1996-1997)	UK[12] (1996)
Demographic						
Sample size	262	565	3379	348	1460	1982
Average age (years)	57.6 (±10.2)	68 (±11)	NA	NA	63.8 (±8.4)	NA
< 60	133 (50.8%)	NA	(54.8%)	(55.5%)	NA	(50%)
≥ 60	129 (49.2%)	NA	(45.2%)	(44.5%)	NA	(50%)
Male	183 (69.8%)	(75%)	(75.3%)	(75.9%)	(64.6%)	(49.7%)[i]
Female	79 (30.2%)	(25%)	(24.7%)	(24.1%)	(35.4%)	(50.3%)[i]
History of Coronary Artery Disease						
Average duration of CAD (years)	4.0 (±3.9)	NA	NA	NA	NA	NA
Average walking distance (meter)	545 (±774)	NA	NA	NA	NA	NA
MI[a]	141 (53.8%)	(53%)	(26.3%)[h]	NA	NA	(24.7%)
MI < 12 months	67 (47.5%[f])	NA	NA	NA	NA	NA
CR[b]	159 (60.7%)	(62%)	(52.2%)	(50.6%)	NA	(51.5%)
CR < 12 months	82 (51.6%[g])	NA	NA	NA	NA	NA
PTCA[c]	94 (69.6%[g])	NA	(53.1%[g])[h]	(80.7%[g])	NA	(48.5% [g])[h]
CABG[d]	41 (30.4%[g])	NA	(46.9%[g])[h]	(19.3%[g])	NA	(51.5% [g])[h]
Hospital stay[e]	174 (66.4%)	(32%)	(100%)[h]	(100%)	NA	(100%)

[a]Myocardial infarction. [b]Coronary revascularization. [c]Percutaneous transluminal coronary angioplasty. [d]Coronary artery bypass graft. [e]Because of CAD within last year. [f]Percentage expressed against patients with history of MI. [g]Percentage expressed against patients with history of CR. [h]Selection criteria ensured equal proportions of MI, CABG, PTCA and myocardial ischemia. [i]Selection criteria ensured equal representation of men and women. NA: data were not available from published articles.

Table 2. The prevalence of cardiovascular risk factors among Jordanian CAD in comparison with other studies.

Cardiovascular Risk Factors	Number/Mean (Percent/ ±SD)							
	Jordan (CAD) (2003-2004)	Jordan (General Public)		Switzerland[11] (2003)	Europe[9] (1999-2000)	Australia[10] (1999-2000)	USA[13] (1996-1997)	UK[12] (1996)
		(2002)[17]	(2004)[16]					
Current Smoking[a]	45 (22.1%)	(29.8%)	(25%)	(17%)	(20.8%)	(17.4%)	(12.9%)	(19%)
Obesity	74 (29.7%)	(12.8%)	NA	NA	(32.8%)	(29.8%)	NA	(27.9%)
Abnormal Body Weight	201 (80.7%)	(45.2%)	(73%)	NA	NA	(75.1%)	NA	(72%)
Hypertension[a]	226 (86.3%)	(22.2%)	(26%)[c]	(65%)	NA	NA	(62.6%)	NA
Diabetes[a]	165 (63%)	(6.4%)	(13%)[c]	(22%)	(21.9%)	(17.5%)	(23.6%)	NA
Dyslipidemia[a]	195 (74.4%)	(20.9%)	(38%)[c]	(71%)	NA	NA	(100%)[d]	NA
Family History[b]	123 (47.7%)	NA	NA	NA	NA	NA	(46%)	NA

[a]Reported. [b]First degree relatives with history of premature CAD, definite MI, or sudden death because of CAD (men<55 years of age or women<65 years of age). [c]By direct measurement of BP, FPG, and lipid profile. [d]The study was conducted on patients suffering from dyslipidemia. NA: data were not available from published articles/sources.

Table 3. Management gap of co-morbid medical problems in Jordanian patients with CAD as compared to other studies

| Character	Number/Mean (Percent/ ±SD)					
	Jordan (2003-2004)	Switzerland[11] (2003)	Europe[9] (1999-2000)	Australia[10] (1999-2000)	USA[13] (1996-1997)	UK[12] (1996)
Blood Pressure ≥ 140/90 mmHg ≥ JNC-7[a]	137 (52.9%) 191 (73.7%)	(49%) NA	(53.9%) NA	(39.5%) NA	NA NA	NA NA
Fasting Plasma Glucose[b] ≥ 130 mg/dl	67 (62%)	NA	NA	(70.5%)	NA	NA
Low Density Lipoprotein Cholesterol[c] ≥ 100 mg/dl ≥ 130 mg/dl	141 (71.6%) 86 (58.9%)	NA (62%)	NA NA	(45.5%) NA	(82%) NA	NA NA
Total Cholesterol[c] ≥ 154 mg/dl ≥ 174 mg/dl ≥ 193 mg/dl ≥ 232 mg/dl	197 (87.6%) 168 (74.7%) 123 (54.7%) 69 (30.7%)	NA NA (46%) NA	NA NA (58.8%) (26.7%)	(74.1%) (54%) (35.6%) NA	NA NA NA NA	NA NA (82%) (55%)

[a]BP ≥ 140/90 mmHg (non diabetics) & BP ≥ 130/80 mmHg (diabetics). [b]130 mg/dl = 7.2 mmol/l glucose. [c]100 mg/dl cholesterol = 2.6 mmol/l, 130 mg/dl cholesterol = 3.4 mmol/l, 154 mg/dl = 4 mmol/l, 174 mg/dl cholesterol = 4.5 mmol/l, 193 mg/dl cholesterol = 5 mmol/l, 232 mg/dl cholesterol = 6 mmol/l. NA: data were not available from published articles

Table 4. The prevalence of selected cardiovascular risk factors among Jordanians, by history of CAD, and age group.

Risk Factors	Patients with CAD (2003-2004)			General Public (2004)[16]		
	Age			Age		
	45-54	55-64	> 64	45-54	55-64	> 64
Obesity	19 (28.8%)	33 (38.4%)	18 (25%)	(22.5%)[a]		(19.3%)[a]
Hypertension	59 (88.1%)	83 (88.3%)	68 (90.7%)	(41%)	(50%)	(57%)
Diabetes	39 (58.2%)	72 (76.6%)*	45 (60%)	(18%)	(25%)	(27%)
Dyslipidemia	50 (74.6%)	72 (76.6%)	56 (74.7%)	(42%)	(53%)	(54%)

*p<0.01. [a]Data were extracted from reference (CDC, 2003).

Figure 1. Association of gender of CAD patients with prevalence of selected cardiovascular risk factors
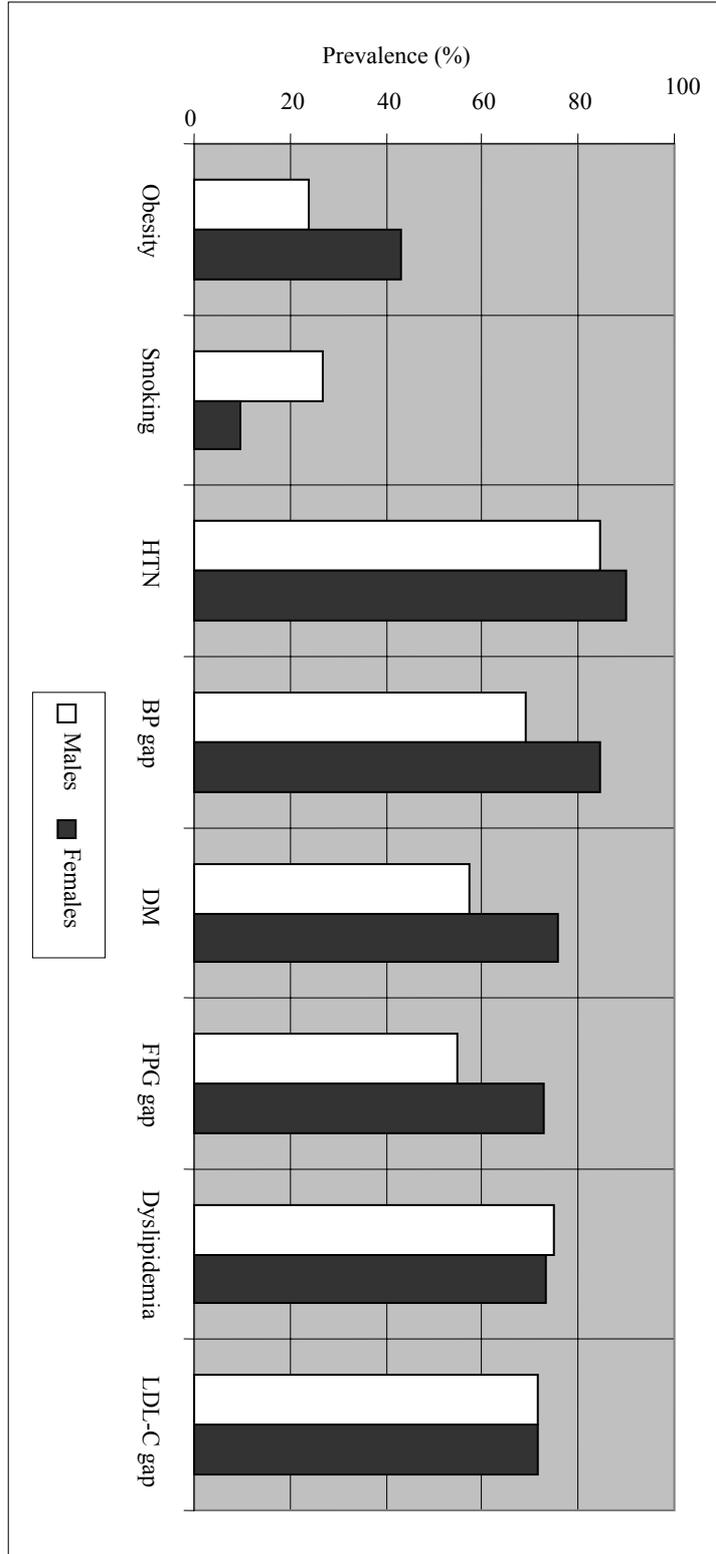
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