Risk Characteristics of Arab and Jewish Women with Coronary Heart Disease in Jerusalem

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Abstract

Background: There is little published information on the coronary risk characteristics of Palestinian women. However, there are documented lifestyle differences as well as socioeconomic inequalities between Arab and Jewish women in Israel.

Objectives: To compare the risk factor characteristics of coronary heart disease patients in Palestinian and Israeli women.

Methods: This study included 546 women (444 Jews and 102 Arabs) aged 35–74, all residents of Jerusalem, who underwent cardiac catheterization at the Hadassah-Hebrew University Medical Center between 2000 and 2003, and were confirmed to have coronary artery disease. Data on multiple risk factors were obtained from patient interviews and files.

Results: Compared with Jewish women, Arab women had a higher prevalence of diabetes, had borne more children, were younger, had a lower socioeconomic status, consumed less alcohol and more olive oil, suffered more passive smoking and were less physically active. On the other hand, fewer Arab women had dyslipidemia, used hormone replacement therapy and had a family history of CHD.

Conclusions: Compared to Jewish women, Palestinian Arab women in Jerusalem appear to have more diabetes and exhibit lifestyle factors that generally increase the risk for CHD. Greater attention to primary prevention in this ethnic group is needed. This study suggests the need to investigate determinants of the metabolic syndrome and the possible role of passive smoking in Arab women as well as modes of intervention via health promotion and risk factor management in this population.

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Limited data are available on coronary heart disease and its risk factor distribution among Arabs in Israel and far less so among Palestinians. Israeli Arabs have a higher CHD mortality than Jews [1]. Mortality due to CHD (but not cancer) and all-cause mortality were substantially higher among Palestinian Arab residents of Jerusalem, both in men and particularly so in women, than Jewish residents of the district aged 35–74 years [2]. The incidence of CHD, defined as acute myocardial infarction and coronary death, was considerably higher in Arabs of both genders than Jews in Jerusalem and ranked among the highest of centers in 20 countries that participated in the WHO-MONICA program [3]. Differences in risk factors between Israeli Arab and Jewish women have been reported: Arab women are more obese, have a greater prevalence of diabetes, exercise less, are less educated

CHD = coronary heart disease

and have a lower socioeconomic status than Jewish women, but also smoke less. With respect to diet a salient difference is the higher olive oil intake among Arabs [4–7]. Such comparative data are not available for Palestinians.

The Arab population of Jerusalem consists predominantly of Palestinians who received formal legal status of permanent residents of Israel after the Six-Day War in 1967. Consequently, Jerusalem can serve as a window through which the health of Palestinians can be observed. These residents differ from West Bank Palestinians in that they are entitled to Israeli national health insurance and social security and have access to the Israeli job market, but differ from Israeli Arabs in several respects. These include not having Israeli citizenship, having been in contact with Israeli society from 1967 onwards rather than from 1948, being in close contact with the West Bank population, and in being large city dwellers (compared with the village and small town residential patterns of most Israeli Arabs).

Our objective in this study was to compare coronary risk factors between Arab and Jewish women with coronary artery disease in Jerusalem. The findings may help focus attention on the need for prevention programs aimed at Palestinian women, a group that has never been specifically targeted for intervention.

Subjects and Methods

Study population

The target study population included all Arab and Jewish women aged 35 to 74, residents of Jerusalem, who underwent cardiac catheterization in the cardiology department of the Hadassah-Hebrew University Medical Center between 2000 and 2003 and were diagnosed with coronary artery disease (defined as at least 50% angiographic obstruction in one or more coronary arteries). Women with normal coronaries were excluded. Altogether, 742 women were identified; 142 patients were not included due to participant refusal or unavailability of critical data. An additional 54 women who died after catheterization were excluded because they could not be interviewed, leaving 546 women in the analysis.

Data collection

Patients participated in a standard telephone interview in 2003, on average one year after catheterization (range 0.5–3.5 years), and computerized records were extracted The data collected included sociodemographic characteristics, lifestyle variables,

classic risk factors, the indication for cardiac catheterization, and catheterization results. Sociodemographic data were obtained by patient interview. Socioeconomic status was determined by per capita net household income, which was classified according to national data reported by the Central Bureau of Statistics.

The lifestyle factors included regular physical activity (defined as a minimum of 30 minutes daily exercise), active cigarette smoking (current smoking of > 1 cigarette daily during at least 2 years before the angiography), passive smoking (defined as smoking ≥ 20 cigarrettes per day by another person living in the same household), alcohol intake (one or more drinks per week), and olive oil consumption as a main source of fat (an average consumption of two or more tablespoons per day).

Data on diabetes mellitus, hypertension (blood pressure ≥140/90 mmHg or anti-hypertensive therapy), dyslipidemia (total cholesterol > 200 mg/dl or low density lipoprotein cholesteral > 160 mg/dl), family history of CHD (over age 55 in first-degree male relatives and < 65 in female relatives), and hormone replacement therapy were obtained from patient charts and interviews. The clinical indication for heart catheterization as well as catheterization results were obtained from medical records. Left ventricular function was evaluated by echocardiography or heart catheterization.

Statistical analysis

Continuous variables are expressed as mean ± SD and categorical variables as proportions. Between-group differences were assessed by chi-square and Fisher's exact tests for categorical variables and the Student t-test for continuous or interval variables.

Results

A number of noteworthy differences between the Arab and Jewish women were found with respect to sociodemographic variables, lifestyle and risk factor status [Table 1]. Arab women were younger (as would be expected from the Arab-Jewish differences in the underlying population age structure), had given birth to more children, and were of lower socioeconomic status. Almost all patients (95%) were postmeopausal.

There was little difference in the relatively low prevalence of smoking between the population groups (21% in Arabs and 26% in Jews). However, almost two-thirds of Arab patients reported passive smoking, more than double the rate among Jewish women. They were physically less active, with only 12% reporting regular exercise versus a fourfold higher rate in Jewish patients. Only 4% of Arab women reported a weekly alcohol intake as compared with 25% of the Jewish patients. On the other hand, over 95% of Arab women reported daily consumption of olive oil, which is believed to be a protective factor against CHD, a rate substantially higher than in the Jewish population. Both groups reported a low prevalence of hormone replacement therapy.

Over 60% of Arab patients had diabetes, dyslipidemia and/or hypertension. The combination of all three was present in 34% of Arab women and 29% of Jewish women. The prevalence of diabetes was significantly higher in the Arab than in the Jewish women, whereas rates of dyslipidemia and hypertension were

Table 1. Comparison of sociodemographic variables, coronary heart disease risk factors and lifestyle parameters between Israeli Arab and Jewish women

	Jewish women (n=444)	Arab women (n=102)	P
Age (yrs)	68 ± 9	63 ± 9	< 0.001
Married	60.9%	52.8%	0.260
Menopause	95%	95%	0.98
No. of children	3.7 ± 2.6	6.5 ± 3.6	< 0.001
Low socioeconomic status	39%	83%	0.001
BMI (kg/m^2)	27.1 ± 5	28.2 ± 6	0.088
Obesity (BMI > 30 kg/m^2)	28%	35%	0.14
Hypertension	73%	65%	0.250
Antihypertensive therapy	98%	94%	0.330
Smoking	26%	21%	0.480
Passive smoking	28%	62%	< 0.001
Diabetes mellitus	46%	61%	0.011
Dyslipidemia	79%	69%	0.006
Family history of CHD	56%	40%	0.048
Physical activity	44%	12%	< 0.001
Olive oil consumption	65%	98%	< 0.001
Alcohol intake	26%	4%	< 0.001
Hormone replacement therapy	12%	5%	0.047

Arab patients were younger and had more children than Jewish women.

Table 2. Indications and results of cardiac catheterization

	Jewish women (n=444)	Arab women (n=102)	P
Indication for angiography			
STEMI	10%	22%	
NSTEMI	10%	16%	0.003
Unstable angina	78%	61%	
Chest pain / Other	2%	1%	
No. of affected coronaries			
Single-vessel disease	34%	33%	
Double-vessel disease	28%	33%	NS
Triple-vessel disease	38%	34%	
Left ventricular function			
Good	74%	73%	
Mild dysfunction	8%	9%	NS
Moderate dysfunction	15%	18%	
Severe dysfunction	3%	0%	

STEMI = ST elevation myocardial infarction, NSTEMI = non-ST elevation myocardial infarction. Note that the proportion of acute myocardial infarction as an indication for catheterization in Arabs was almost double that of Jews (38% vs. 20% respectively). No significant differences in the number of the affected coronary arteries or in left ventricular function were observed.

higher in the Jewish patients. Arab and Jewish patients were similarly overweight, with about one-third being obese. As expected, diabetic women of both ethnic groups in our study had higher mean body mass index values than non-diabetic women (mean BMI in diabetic Arab and Jewish women was 29.2 and 28.4 kg/m^2,

respectively, as compared to 27.0 and 26.7 kg/m^2 in non-diabetic women, respectively, $P = 0.045$).

Acute myocardial infarction was a more frequent indication for angiography in Arab than Jewish patients and the reverse was observed for unstable angina. There were no significant between-group differences in the number of affected coronary arteries or in left ventricular function [Table 2]. Diabetic patients suffered more from multi-vessel disease (74%) compared with non-diabetics (54%), $P < 0.001$.

Discussion

This study evaluated the coronary risk characteristics of Palestinian and Israeli women with coronary artery disease as determined by angiography. Palestinian women have been shown to be at high risk for CHD [2,8]. Our case series permits an initial view of the risk factor patterns that may be driving the high incidence of acute myocardial infarction and CHD death in the Palestinian population of Jerusalem. The findings, albeit based on CHD cases and not on a population sample, suggest that a high prevalence of diabetes, frequent exposure to passive smoking, low socioeconomic status, lack of exercise and a minute alcohol intake in Palestinians may explain part of the excess coronary risk. These factors would seem to overwhelm the possible protective effects of daily olive oil consumption that was universally present in the Palestinian patients.

Diabetes mellitus

Obesity, central obesity and diabetes are more prevalent among Israeli Arab women than their Jewish counterparts [9]. Some population-based data in Palestinians point to a high prevalence of the metabolic syndrome, especially among women [10,11]. Impaired glucose metabolism may be a very important determinant of the high rates of CHD in this population. Our findings of a very high prevalence of diabetes in Palestinian CHD patients (61%) supports this view and confirms an earlier study that noted a similar high prevalence [8]. In the present study the diabetic patients regardless of their ethnic group were younger by an average of 2 years than the non-diabetic women (Arabs with and without diabetes 63.1 and 65.2 years, respectively; Jews with and without diabetes 66.8 and 68.6 years, respectively, $P < 0.001$), which is consistent with evidence that diabetes accelerates the atherogenic process and that the burden of the disease in the coronary arteries is greater among diabetic patients [12]. Understanding the determinants of this susceptibility to diabetes and its complications in Arab women, both genetic and lifestyle, remains a challenge that warrants further investigation. Primary prevention of diabetes among Palestinians, and adequate glycemic control and aggressive treatment of coronary risk factors in diabetic patients, should be high priority targets.

Cigarette smoking

Cigarette smoking was relatively infrequent in both groups. However, Arab women suffered more from passive smoking, re-

BMI = body mass index

flecting a high burden of smoking among Palestinian men. A high prevalence of smoking has also been noted among Israeli Arab men compared with Jewish men [6]. A number of studies have shown that long-term exposure to environmental tobacco smoke increases the risk of lung cancer and CHD [13]. The potential deleterious role of extensive passive smoking in Arab women needs further elucidation.

Dyslipidemia

The prevalence of dyslipidemia was higher in the Jewish than the Arab patients. This might suggest different risk factors for CAD in these ethnic groups, but it is also consistent with a probably greater awareness in the more educated Jewish population regarding routine testing in the community, and hence greater reporting.

Family history of CHD

The prevalence of a family history of CHD was higher in the Jewish patients. Likely explanations include possible reporting bias or later exposure of the Palestinian population to the CHD epidemic (i.e., a cohort effect). A family history of premature CHD is an independent predictor of coronary risk in women, particularly among younger individuals with a family history of premature disease [14]. The reliability of a self-reported family history of CHD or of risk factors for CHD has been questioned. It has also been suggested that the additional contribution of family history to CHD risk estimation after inclusion of other traditional risk factors is relatively modest [15]. We have no information on the validity of self-reporting among Palestinians, whereas in the Jerusalem Lipid Research Clinic Study, family history was an independent predictor among the Jewish population [16].

Obesity

According to a Ministry of Health survey in Israel (1999–2001), obesity is a major problem among Israeli Arab women, among whom 41% had a BMI > 30 compared with 22% for non-Arab Israeli women [5,17]. In contrast, in our case series there was no significant difference between the two ethnic groups for mean BMI, nor in the proportion of women with BMI > 30 (which was somewhat lower than expected in Palestinian patients compared with the general Israeli Arab population). Prevention of weight gain among young Palestinian women, particularly among the less educated, is an important challenge.

Hypertension

Increased cardiovascular risk associated with elevated blood pressure is seen particularly in premenopausal women, for whom the presence of hypertension is associated with a tenfold increase in coronary mortality [18]. In our study there were no significant differences in hypertension prevalence between the two ethnic groups. Similar findings have been reported among the Arab and Jewish populations of Israel [4].

Socioeconomic status

Certain psychosocial and behavioral factors are associated with an increased risk and a poor prognosis of CHD in women. Lower

socioeconomic status, particularly in women, has consistently been associated with increased cardiovascular morbidity and mortality. Most of the increased risk appears to be due to psychosocial stress and lifestyle factors and, to a lesser extent, traditional risk factors of hypertension and dyslipidemia [19]. As has been suggested [8], and also seen in our patients, the lower socioeconomic status of Palestinian Arab residents may play a role in their increased risk.

Protective factors

Alcohol intake and physical activity, believed to be protective against CHD, were remarkably lower in the Palestinian than Jewish patients.

Alcohol intake

Observational epidemiological studies consistently indicate that moderate alcohol intake has a protective effect against CHD. The benefit associated with light to moderate drinking is most apparent among women with risk factors for CHD and in those ≥ 50 years old [20]. Most of the benefit of alcohol appears to be mediated by an elevation in plasma high density lipoprotein cholesterol [21], although antioxidant, antithrombotic, and anti-inflammatory effects have also been suggested. Alcohol intake in the Jewish population of Israel is low [22], and due to religious proscription is likely to be even lower among Moslem Arabs. In our study, alcohol intake was extremely low in the Arab patients. Because of this low intake, Jews and particularly Moslem Arabs do not enjoy the apparent protective effects of alcohol.

Physical activity

In our study, Arab patients were less physically active, consistent with a Ministry of Health population-based survey in which only 8% of Arab women exercised compared with 24% of non-Arab women [17]. This population is denied the protection afforded by exercise, even light to moderate [23].

Olive oil consumption

There are dietary differences between the two populations. Olive oil intake, the main source of fatty acids in the Arab population and a major component of the Mediterranean diet, is believed to be protective [24]. Virgin olive oil, besides containing monounsaturated fat, is rich in at least 30 phenolic compounds (the major ones being oleuropein, hydroxytyrosol and tyrosol) and has antioxidant and radical-scavenging properties [25]. However, this potential protective effect due to the higher consumption in the Arab group may be overwhelmed by other differences in coronary risk factors [8].

Parity

Arab patients had on average more children (6.3) than Jewish women (3.7). There is limited evidence for an association between the number of pregnancies and the risk of CHD. If increasing parity is indeed a risk factor for CHD, this is of substantial importance for the Palestinian population in which a large proportion is multiparous.

Indication and results of catheterization

Unstable angina was the dominant indication for angiography in both groups, more so among the Jewish patients, whereas in Arabs the indication of acute myocardial infarction was almost double that of Jews. The reason for the difference is not clear. It is possible that the ratios of acute myocardial infarction to unstable angina differ in the source populations, and/or that lower proportions of Arab patients with unstable angina were offered or accepted angiography than Jews. Another possibility is that the Arab patients presented at hospital with a more severe condition, possibly due to less knowledge and awareness of heart attack and less available medical care. It is important to stress that there were no differences in the catheterization and echocardiography results (coronary anatomy and left ventricular function) for Arab compared with Jewish patients.

Limitations

This case series may be limited in its generalizability to the source populations that generated the events and the consequent interventions. In addition, self-reported variables such as dyslipidemia and hypertension may be affected by differential patient and physician awareness of the importance of routine screening tests. This might be one possible explanation for our finding of less dyslipidemia in the Arab patients. In addition, we recognize a possible source of non-response bias due to the exclusion of the 142 non-participants.

Conclusions

The findings of this study suggest that in addition to the higher prevalence of diabetes, cultural and lifestyle factors among Arab women in Jerusalem – including very low alcohol intake, low levels of exercise, a particularly high prevalence of passive smoking, and high parity – may place the population at excess risk. The incidence of CHD in this population can be reduced by health promotion programs directed to lifestyle modification and risk factor management. Encouraging exercise and targeting smoking among spouses should be high priority goals.

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When eating bamboo sprouts, remember the man who planted them

Chinese proverb

Capsule

Gene expression and lung cancer

Lung cancer is the leading cause of death from cancer in the USA and the world. The high mortality rate (80–85% within 5 years) results, in part, from a lack of effective tools to diagnose the disease at an early stage. Given that cigarette smoke creates a field of injury throughout the airway Spira et al. sought to determine if gene expression in histologically normal large-airway epithelial cells obtained at bronchoscopy from smokers with suspicion of lung cancer could be used as a lung cancer biomarker. Using a training set (n=77) and gene-expression profiles from Affymetrix HG-U133A microarrays, they identified an 80-gene biomarker that distinguishes smokers with and without lung cancer. The biomarker was tested on an independent test set (n=52), with an accuracy of 83% (80% sensitive, 84% specific), and on an additional validation set independently obtained from five medical centers (n=35). The biomarker had 90% sensitivity for stage 1 cancer across all subjects. Combining cytopathology of lower airway cells obtained at bronchoscopy with the biomarker yielded 95% sensitivity and a 95% negative predictive value. These findings indicate that gene expression in cytologically normal large-airway epithelial cells can serve as a lung cancer biomarker, potentially owing to a cancer-specific airway-wide response to cigarette smoke.

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