

## Physicians' Attitudes toward Preventive Therapy for Coronary Artery Disease: Is There a Gender Bias?

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### Summary

**Background:** While much of the gender difference in the treatment of coronary artery disease (CAD) results from the fact that the women being treated are older and have more comorbidities, it remains to be established whether a true gender bias exists. We compared physicians' attitudes and practice toward preventive therapy in men and women with CAD.

**Hypothesis:** Physicians perceive the prevention of CAD in men as more important than in women.

**Methods:** In the "attitude study," we obtained data on the attitudes of 172 physicians toward treatment, using hypothetical case histories of 58-year-old male and postmenopausal female patients with identical clinical and laboratory data and mild coronary atherosclerosis on angiography. In the "actual practice study," we evaluated the lipoprotein levels and prescription of lipid-lowering medications from medical records of 344 male and female patients with angiographic evidence of CAD.

**Results:** In the hypothetical case histories, physicians in general considered the male patient to be at higher risk and prescribed aspirin (91 vs. 77%,  $p < 0.01$ ) and lipid-lowering medications (67 vs. 54%,  $p < 0.07$ ) more often for the male patient. Evaluation of medical charts of patients with CAD revealed that in patients with baseline low-density lipoprotein cholesterol  $> 110$  mg/dl, 77% of the males received a lipid-lowering medication, compared with only 47% of the female patients ( $p < 0.001$ ).

**Conclusions:** We found evidence for a gender bias in the attitude as well as in actual practice of secondary prevention toward patients with CAD. While the proportion of male patients receiving lipid-lowering medications appears appropriate, the proportion of women receiving such treatment remains undesirable.

**Key words:** coronary artery disease, prevention, attitude, physicians, gender bias

### Introduction

Although often conceptualized as a disease of importance primarily in men, coronary artery disease (CAD) is also the leading cause of death in women in most developed countries, accounting for almost 45% of all deaths in women.<sup>1</sup> After the age of 70 years, the risk of death from CAD is similar in men and women.<sup>2</sup> Several large clinical studies have provided clear evidence that prevention of CAD is feasible in women, both in primary and secondary prevention settings.<sup>3,4</sup> Despite this, the rate of decline in deaths from CAD in the past two decades has been slower in women than in men.<sup>5</sup>

The topic of gender bias in the diagnosis and treatment of CAD has been the subject of an increasing number of investigations during the past decade. Several reports have documented a worse prognosis for women than for men with CAD. However, while some studies reported a gender bias in the utilization of diagnostic and therapeutic interventions,<sup>6–9</sup> other studies found no such bias after correcting for differences in severity of illness at presentation, age, and comorbidity.<sup>10–13</sup> Similarly, gender differences in the use of lipid-lowering medications and other preventive interventions have been found in some<sup>14,15</sup> but not all<sup>16</sup> studies.

The purpose of this study was to examine whether differences exist in the manner in which physicians perceive the need for preventive therapy in women and men with chest pain and angiographic evidence of coronary atherosclerosis. Physicians' attitudes were evaluated using hypothetical patient case histories, while actual practice was evaluated by comparing the prescription of lipid-lowering therapy in male and female patients with CAD.

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## Methods

The study was comprised of two components. The first consisted of hypothetical case histories of a male and a female patient with chest pain that were presented to 172 physicians who are involved in the care of patients with CAD (internists, cardiologists, family physicians, and general practitioners) in three geographically distinct areas of Israel. Both patients were 58 years old. They had identical clinical, laboratory, and imaging findings that included a normal physical examination, a normal resting electrocardiogram, mildly elevated low-density lipoprotein (LDL) cholesterol levels of 140 mg/dl, a high-density lipoprotein (HDL) cholesterol level of 48 mg/dl, equivocal abnormalities on a stress nuclear test, and mild coronary atherosclerosis on angiography that did not require angioplasty (a 40% stenosis in the right coronary artery and a 40% stenosis in the left circumflex artery). At the end of each case history, the physician was presented with four written multiple-choice questions relating to the etiology, treatment, and prognosis of each patient. The first question inquired about the etiology of the chest pain (possible answers: myocardial ischemia due to fixed obstruction, myocardial ischemia due to coronary spasm, and noncardiac origin of pain). The second question presented six optional medications (a nitrate, a beta-adrenergic blocker, a calcium-channel blocker, an angiotensin-converting enzyme [ACE] inhibitor, a statin, and aspirin), allowing the physician to choose as many medications as necessary for each patient. The third question asked about the target LDL cholesterol level appropriate for the patient ( $\leq 160$ ,  $\leq 130$ , or  $\leq 100$  mg/dl), and the fourth question asked the physician to estimate the patient's risk for a future cardiovascular event (very low, low, average, high, or very high).

The physicians were recruited during continuing medical education (CME) sessions on subjects unrelated to the topic of the study. They were told that the aim of the study was to evaluate their attitudes toward preventive cardiology in patients with varying severity of CAD and filled out the questionnaires on the spot before the CME session. The emphasis on the gender of the patients was masked by embedding these two scenarios in four additional hypothetical cases that also examined other issues related to management of CAD.

In the second part of the study, a list of patients who had undergone coronary angiography between the years 1997 and 2000 was generated from a computerized database of a large health maintenance organization (HMO) in the Negev District of southern Israel. All patients who belong to this HMO undergo blood tests, cardiac catheterizations, other cardiologic evaluations, and follow-up at the Soroka University Medical Center. All prescriptions filled by these patients are recorded in the HMO's central pharmacy computerized database (provided the patient requests reimbursement by the HMO). Excluded from the list were patients older than 70 years, patients with a history of myocardial infarction, those who were catheterized for reasons other than suspected coronary disease (valvular disease, cardiomyopathy, etc.), those who died within 3 months of catheterization, and those with underlying diseases

that prohibited the use of certain medications (active hepatic disease, chronic renal failure, peptic ulcer, myositis).

From this list we randomly selected 172 women and 172 men with angiographic evidence of significant CAD ( $> 50\%$  stenosis of at least one major coronary artery). Demographic, clinical, and laboratory data for all these patients were derived from clinical charts of the cardiology service, as well as the computerized hospital database. Lists of all prescriptions filled by each of the patients were generated from the HMO's central pharmacy computerized database. Missing data were ascertained by contacting the patient's family physician. Patients whose records were judged to have insufficient data were excluded from the analysis.

The study was approved by the local Institute Review Board.

## Statistical Analysis

Associations between categorical variables were tested using the chi-square test. Comparisons of percentages were conducted using Z-tests. Associations between physician types and answers on the questionnaire were evaluated using chi-square tests. We then divided the sample of physicians into two groups: general practitioners with family physicians (GP group) and cardiologists with internists (cardio group). This was done since the number of physicians in each specialization was too small to conduct meaningful analyses. In addition, cardiologists and internists share common clinical approaches, while general practitioners and family physicians also share common clinical approaches and clinical setup.

## Results

Table I shows the demographic characteristics of the 172 physicians who participated in the study. Their age and gender is representative of the usual demographics of physicians in these subspecialties in the region in which the study was performed. Table II shows the attitude of the physicians toward the cause of the chest pain, the risk of a future cardiac event, and the preferred LDL target goal in the hypothetical patients. The pain was considered to be of cardiac origin more often in

TABLE I Characteristics of the physicians participating in the study (n = 172)

Age (years $\pm$ standard deviation)	41.8 $\pm$ 8.2
Females (%)	51.4
Years since graduation from medical school (%)	
0-5	20
6-10	10
> 10	70
Medical specialization (%)	
General practitioner	17
Family medicine	40
Internal medicine	29
Cardiology	14

TABLE II Results of physician responses to the patient scenario questionnaire (percent of physicians providing this answer)

Patient gender	All specialties		General practitioners and family physicians		Internists and cardiologists	
	M	F	M	F	M	F
Cardiac cause of the chest pain	63.8	48.5 <sup>a</sup>	72.2	51.6 <sup>a</sup>	50.7	42.2
High risk for a future cardiac event	80.1	57.7 <sup>b</sup>	86.0	55.8 <sup>b</sup>	71.2	59.3 <sup>b</sup>
Target LDL cholesterol <130 mg/dl	91.0	82.0	92.7	79.8 <sup>a</sup>	87.3	85.0
Medication should be prescribed						
Aspirin	90.6	77.2 <sup>a</sup>	88.4	74.4 <sup>a</sup>	94.4	79.4
ACE inhibitor	12.5	10.0	11.5	10.3	14.8	8.5
Statin	66.5	53.9	65.3	47.4 <sup>a</sup>	69.0	61.0

<sup>a</sup> p < 0.05.<sup>b</sup> p < 0.001.

Abbreviations: M = male patients, F = female patients, LDL = low-density lipoprotein, ACE = angiotensin-converting enzyme.

the male than in the female patient, as was the risk of a future cardiac event. A higher percentage of doctors aimed at a target LDL cholesterol level < 130 mg/dl for men than for women. All these differences were more pronounced among the general practitioners and family physicians compared with the internists and cardiologists.

The attitude of physicians toward medication prescription also differed for the male and female patients (Table II). Thus, both groups of physicians tended to prescribe aspirin more often to the male patient. A similar trend for prescribing a statin was seen only among the community-affiliated physicians.

Table III shows the characteristics of the patients with significant CAD who were chosen randomly from the computerized database. The female patients were older than the

males, had higher baseline levels of total cholesterol, LDL cholesterol, and HDL cholesterol levels, had a similar frequency of triple-vessel coronary disease, but underwent less revascularization procedures than the male patients. The prescription of statins in patients with LDL cholesterol levels > 110 mg/dl was significantly more common in male patients. This difference remained statistically significant (p < 0.03) after adjusting for age.

## Discussion

The male and postmenopausal female patients presented to the physicians in the hypothetical case scenarios were of sim-

TABLE III Characteristics of patients with significant coronary artery disease randomly chosen from the computerized database of the catheterization laboratory at Soroka University Medical Center

	Male patients n = 172		Female patients n = 172	
	Baseline <sup>b</sup>	Final <sup>c</sup>	Baseline <sup>b</sup>	Final <sup>c</sup>
Age (years ± SD)	60.4 ± 12.6		67.5 ± 11.3	
% patients with triple-vessel disease	40		51	
% patients undergoing a revascularization procedure	63		36 <sup>f</sup>	
Lipoprotein levels mg/dl				
Total cholesterol	201.9 ± 43.3	184.8 ± 39.2	218.9 ± 47.2 <sup>e</sup>	199.7 ± 42.3 <sup>f</sup>
Triglyceride	184.5 ± 84.4	167.2 ± 101.4	163.5 ± 90.4	160.7 ± 84.5
LDL cholesterol	127.3 ± 32.0	112.8 ± 33.1	136.9 ± 39.5 <sup>d</sup>	119.9 ± 38.4 <sup>d</sup>
HDL cholesterol	43.3 ± 16.7	43.6 ± 17.9	48.4 ± 12.8 <sup>e</sup>	49.9 ± 13.3 <sup>f</sup>
% of patients with final LDL cholesterol < 110 mg/dl	49.1		41.6	
% of patients eligible for statin therapy who received a statin <sup>a</sup>	65.6 <sup>e</sup>		43.8 <sup>e</sup>	

<sup>a</sup> Patients eligible for statin therapy are those with baseline LDL cholesterol > 110 mg/dl.<sup>b</sup> Lipoprotein levels before treatment with lipid-lowering drugs.<sup>c</sup> Final lipoprotein levels available.<sup>d</sup> p ≤ 0.05 for the difference between male and female patients.<sup>e</sup> p ≤ 0.01 for the difference between male and female patients.<sup>f</sup> p < 0.001 for the difference between male and female patients.

Abbreviations: SD = standard deviation, LDL = low-density lipoprotein, HDL = high-density lipoprotein.

ilar age and had similar symptoms, laboratory results, and angiographic findings, differing only in gender. Despite this, a higher proportion of physicians suspected a cardiac origin of the chest pain and predicted a higher risk for a future cardiovascular event in the male patient. Accordingly, they decided to prescribe aspirin and statins more often and aimed to achieve a lower LDL cholesterol target goal for the male patient. These results indicate that despite the similarity in clinical characteristics in the two patients, the need for preventive therapy is conceived as being more important in male patients. This trend is further supported by the finding that among patients from the registry with significant CAD, a higher proportion of males actually received statin therapy. Differences in severity of coronary disease and frequency of revascularization procedures (Table III) cannot explain this difference.

The prediction of risk for morbidity and mortality in our hypothetical patients is not simple. Both had chest pain, minor perfusion defects on the stress thallium scan, and evidence of mild atherosclerosis on coronary angiography. Thus, they cannot be considered as true "primary-prevention" cases for whom the Framingham risk score can be applied.<sup>3</sup> The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults guidelines<sup>3</sup> do not specifically address this issue, but do place heavy emphasis on other evidence of subclinical atherosclerosis as "coronary risk equivalents" and thus at higher risk for CAD events. The European guidelines<sup>17</sup> specifically recommend "institution of preventive strategies in patients with occult atherosclerotic lesions in a manner similar to those with established CAD." The Israeli Atherosclerosis Society, in collaboration with other societies involved in the treatment of atherosclerosis, have published guidelines for the detection and treatment of atherosclerosis.<sup>18</sup> These are based on a combination of the NCEP and the European guidelines and use the same LDL threshold levels for initiating drug treatment as well as the same LDL target levels as the NCEP guidelines.

Analysis of physician subspecialty suggests that the gender-related differences in Israel occur more prominently among general practitioners and family physicians ("community affiliated") than among internists and cardiologists ("hospital affiliated"). Grouping of subspecializations was done for the sake of increasing the sample size of each group of physicians and may appear rather arbitrary. However, general practitioners and family physicians in Israel generally work together in common clinics, devote most of their time to primary care, and share CME sessions, while internists and cardiologists work mostly in hospital settings and share a significant part of their residency training. In addition, separate subanalysis of the answers by each subspecialty revealed similarities between general practitioners and family physicians and between internists and cardiologists. It appears that the majority of gender bias occurs in the primary-care environment.

Several weaknesses of the study need to be noted. In the case scenarios, the degree of coronary artery stenosis was "minimally obstructive." It is possible that the use of patients with more severe coronary stenosis might have yielded different responses. However, the results of the differential use of

statins in "real life" male and female patients with significant coronary stenosis suggest otherwise. There are also some limitations to our analysis of the use of statins in the registry patients. Thus, we only have data on those prescriptions that were actually filled by the patients at the HMO's pharmacy. Although it is possible that in some cases recommendations by the physician for beginning therapy with a statin were disregarded by patients, we have no reason to believe that the proportion of this phenomenon differs between male and female patients. The use of computerized data rather than individual chart analysis does not allow us to correlate statin prescription patterns in relationship to physician specialty and gender, as any patient may be seen by more than one physician in the community and/or the hospital. In addition, the identity of the physicians who participated in the first part of the study ("hypothetical patients") was not necessarily identical to those who treated the patients in part 2 of the study ("real patients"), and therefore the linkage between attitude and practice of physicians should be taken with caution. Finally, the generalizability of these results to other countries and medical communities requires further proof.

## Conclusion

Our study suggests that a true gender bias exists, both in the attitude and in actual practice of physicians toward the secondary prevention of CAD. Better physician education on the efficacy and importance of secondary prevention strategies in women with CAD seems warranted.

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