Risk factors for coronary artery disease in newly diagnosed non insulin dependent diabetes mellitus: Prevalence in Bahraini compared with Asian Indian patients

Onyechi Modebe, MD, FACP, Bassem Mohammed, MD, Ranjana Garg, MD.

ABSTRACT

Objective: To compare the prevalence of coronary risk factors in Bahraini Arab and Asian Indian male patients at the time of diagnosis of non insulin dependent diabetes mellitus.

Methods: One hundred and forty six Bahraini and 44 Asian Indian male patients with newly diagnosed non insulin dependent diabetes mellitus were seen over a 24 month period. Anthropometric indices, prevalence of hypertension and smoking, as well as the lipid profiles were determined.

Results: No statistically significant difference was found in waist-to-hip ratio, prevalence of hypertension or smoking, and the serum concentrations of triglyceride, low density lipoprotein or high density lipoprotein cholesterol.

Obesity was more common in the Bahraini patients.

Conclusion: The risk factors for coronary artery disease are as common and as severe in Bahraini male patients as in Asian Indian male patients with non insulin dependent diabetes mellitus. If these risk factors are also associated with a high degree of insulin resistance in the Bahraini patients, then coronary artery disease would probably be as common a problem among them as has been repeatedly documented in Asian Indians in several parts of the world.

Keywords: Non insulin dependent diabetes mellitus, coronary risks, Bahraini, Arabs, Asians, cholesterol.


Ethnic origin is well recognised as an important factor determining the prevalence of coronary artery disease (CAD) and the associated morbidity and mortality. Reports from many countries document higher morbidity and mortality from CAD among immigrant Asians from the Indian subcontinent (herein referred to as Asian Indians) than among other ethnic groups living in the same communities.1-4 On the other hand, detailed data on the prevalence of either cardiovascular diseases or their risk factors in Middle East Arabs are scarce although available reports suggest that the prevalence of an atherogenic lipid profile,5 as well as morbidity and mortality from CAD6 may also be high in some populations in the region. However, the prevalence of diabetes mellitus, an important risk factor for CAD, has been reported to be high in both Asian Indians7-9 and Middle East Arabs.10-12

A large number of Asians from the Indian subcontinent live and work in Bahrain. This has been exploited to compare the prevalence of various risk factors for CAD in adult Bahraini and Asian Indian patients at the time of diagnosis of non insulin dependent diabetes mellitus (NIDDM), in order to

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gain some insight into possible similarities and differences in the risk factors for CAD in these ethnically different populations.

**Methods.** From March 1993 until February 1995, all patients referred to the adult diabetic unit of the Bahrain Defence Force Hospital with a new diagnosis of definite or suspected diabetes mellitus, were evaluated. All data reported here was collected after the initial stabilization of the patients. However, the decision about the presence or absence of hypertension was based on multiple blood pressure readings taken during the initial and subsequent clinic visits. Each patient provided information about his age, nationality, the number of cigarettes smoked per day, and the duration of smoking.

Height and weight were measured in each patient to determine the body mass index (BMI). Waist circumference was measured in the standing position, at the end of gentle expiration, at a level midway between the lower rib margin and the iliac crest. Hip circumference was measured at the maximum posterior extension between the iliac crest and buttocks. Blood pressure was obtained with a mercury manometer with the patient in a sitting position and the arm at heart level, after resting for at least 15 minutes. The pressure at which Korotkoff sound disappeared (Phase 5) was taken as the diastolic blood pressure.

Venous blood was collected between 0600 and 0800 hours, after a fast of 12 to 14 hours, for the determination of plasma glucose and serum lipid concentrations. Plasma glucose was determined by the glucose oxidase method (Boehringer Mannheim, Mannheim, Germany). Serum concentrations of total cholesterol and triglycerides were determined by enzymatic methods (Boehringer Mannheim). The serum concentration of high-density lipoprotein (HDL) cholesterol was also determined after very-low-density lipoprotein (VLDL) and low-density lipoprotein (LDL) were precipitated with phosphotungstate (Boehringer Mannheim). Serum concentration of LDL-cholesterol was estimated using the formula of Friedewald. Serum thyrotropin and free thyroxine concentrations were determined in patients with hyperlipidemia to exclude hypothyroidism.

Diabetes mellitus was diagnosed and classified according to criteria recommended by the National Diabetes Data Group. Patients were classified as hypertensive if the mean blood pressure over three clinic visits was systolic >140 mmHg and/or diastolic >90 mmHg, or if the patient was on any antihypertensive drug. Smoking was considered to be present when the patient smoked one or more cigarettes per day. A serum concentration of total cholesterol ≥2.6 mmol/L or an LDL-cholesterol ≥4.1 mmol/L were considered to be elevated. Also serum HDL-cholesterol concentration was considered abnormal if it was <0.9 mmol/L. Hypertriglyceridemia was defined as a serum triglyceride concentration ≥2.26 mmol/L.

The body mass index was calculated as the weight in kilograms divided by the square of the height in meters (kg/m²). Obesity was defined by BMI ≥27.3 kg/m² for men, which is approximately 120 percent of ideal body weight. Although the cutoff level for an abnormally high waist-hip ratio (WHR) probably varies in different ethnic groups, we have used a value of 0.95 to identify men with an abnormal WHR. This value was derived primarily from mortality data gathered from European populations, and has been suggested for the evaluation of American males.

**Statistical analysis.** All values are given as the mean ± standard deviation (SD). The Student’s t-test or the Chi-square test, as appropriate, was used to check for statistically significant differences between the groups. All P-value ≤0.05 was considered to indicate statistical significance. All statistical tests were two sided.

**Results.** One hundred and forty six Bahraini patients (104 males and 42 females) and 44 Asian Indian patients (38 males and 6 females) were confirmed to have NIDDM. Because of the small number of the Asian Indian females seen during the study period, only the data on the males is presented. Of the 38 Asian males, 24 were from India, 11 were from Pakistan and 3 were from Bangladesh.

Table 1 gives the result of the mean values of the anthropometric indices in both groups. There was no statistically significant difference in the mean age of the groups. However, the mean weight and mean BMI were significantly higher in the Bahraini patients. While 67.3% of these Bahraini males with diabetes met the BMI criterion for obesity, only 26% of the Asian Indians did (P<0.0001). However, central obesity was common in both groups. 55.8% of the Bahraini patients and 40.9% of the Asian Indian patients had a WHR >0.95 (P>0.1). There was also no significant difference in their respective mean WHR (Table 1).

<table>
<thead>
<tr>
<th></th>
<th>Asian Indian (n = 38)</th>
<th>Bahraini (n = 104)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>40.9 +/- 8.1</td>
<td>39.6 +/- 12.9</td>
<td>NS</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>67.6 +/- 12.4</td>
<td>86.7 +/- 17.5</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.65 +/- 0.07</td>
<td>1.68 +/- 0.06</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Body Mass Index (kg/m²)</td>
<td>24.7 +/- 3.7</td>
<td>30.7 +/- 5.1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Waist -hip ratio</td>
<td>0.95 +/- 0.04</td>
<td>0.96 +/- 0.05</td>
<td>NS</td>
</tr>
</tbody>
</table>

NIDDM - Non Insulin Dependent Diabetes Mellitus
Table 2: Concentration of serum lipids in Asian Indian and Bahraini males at diagnosis of NIDDM

<table>
<thead>
<tr>
<th></th>
<th>Asian Indian (n = 38)</th>
<th>Bahraini (n = 104)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cholesterol (mmol/L)</td>
<td>5.9 +/- 1.7</td>
<td>5.8 +/- 1.1</td>
<td>NS</td>
</tr>
<tr>
<td>LDL-cholesterol (mmol/L)</td>
<td>3.8 +/- 1.4</td>
<td>3.9 +/- 1.0</td>
<td>NS</td>
</tr>
<tr>
<td>HDL-cholesterol (mmol/L)</td>
<td>0.94 +/- 0.33</td>
<td>0.95 +/- 0.28</td>
<td>NS</td>
</tr>
<tr>
<td>Triglyceride (mmol/L)</td>
<td>2.57 +/- 1.53</td>
<td>2.98 +/- 2.67</td>
<td>NS</td>
</tr>
</tbody>
</table>

NIDDM - Non Insulin Dependent Diabetes Mellitus

Table 2 summarizes the mean values of the serum concentration of the lipid fractions. Both groups of patients had statistically comparable values for each of the fractions. 43.2% and 44.8% of the Bahraini and Asian patients, respectively, had hypertriglyceridemia. Also the proportion of patients in each group who had an elevation of either total or LDL-cholesterol concentration was similar (P>0.1 for each). A combination of the concentration of serum triglyceride ≥2.26 mmol/L and an LDL-cholesterol to HDL-cholesterol ratio ≥5.0, which identifies patients at a very high risk of cardiac events, was present in 24.5% of the Bahrainis and 25% of the Asians (P>0.1).

Also a low serum HDL-cholesterol concentration was noted in 42.1% and 39.5% of the Asians and Bahrainis, respectively (P>0.1).

A diagnosis of hypertension was established in 25% of both Bahraini and Asian patients. Eighty percent of these hypertensive patients were unaware of the presence of the disorder prior to the diagnosis of diabetes. A history of current cigarette use was obtained in 47.3% and 35.7% of the Bahraini Arabs and Asian Indians, respectively (P>0.25). Among the smokers no difference was noted in the average number of cigarettes used per day.

Discussion. NIDDM is known to be very common in both Asian Indians and Middle East Arabs. Also CAD morbidity and mortality have been found to be higher in immigrant Asian Indians than in most populations living in the same countries against whom they have been compared. The well-known risk factors do not adequately explain the high mortality found in this ethnic group. Although data on the prevalence of CAD in Middle East Arabs is limited, reports suggest that the rates of cardiac events are also high. The current study comparing the risk factors for CAD in these racially different populations, shows that, except for obesity, the prevalence rates and severity of the coronary risk factors are similar in both populations. Hypertension, central obesity, elevated concentrations of serum LDL-cholesterol and triglyceride, as well as low HDL-cholesterol concentration, were very common and had similar frequencies in both groups. The fact that these risk factors occur together in a high proportion of these patients suggests that the metabolic disease syndrome, with the associated hyperinsulinemia and resistance to insulin, probably plays an important role in the pathogenesis of CAD and NIDDM in the Bahrainis as has been documented in the Asian Indians.

Obesity was more common among the Bahraini diabetic patients. The prevalence of central obesity was, however, similar in both groups. Although obesity is recognized as a risk factor for cardiovascular disease, the large epidemiological study in Gothenburg, Sweden, has identified abdominal adiposity as a more important predictor of cardiovascular disease and death in Caucasians than obesity. Whether a high degree of abdominal adiposity, defined by the WHR, is an equally important predictor of CAD or death in other racial group is, in large part, unknown.

The reason why Asian Indians have a higher prevalence of CAD and associated mortality than other ethnic groups against whom they have been compared is yet undefined. Differences between the Asian Indians and various ethnic groups in the established risk factors for CAD including smoking, hypertension, serum concentrations of HDL-cholesterol and LDL-cholesterol as well as dietary habits do not seem to provide a satisfactory explanation for the high mortality found in the Indians. Possibly, the recent report showing that they have a genetic predisposition to a higher degree of hyperinsulinemia and insulin resistance than Caucasians at comparable WHR may provide a partial answer. Although no study has yet evaluated either the presence or degree of hyperinsulinemia or insulin resistance in Bahrainis with or without diabetes, it is likely that they would also have a severely abnormal degree of insulin resistance in view of the similarity of their lipid profile, and the prevalence of both abnormal WHR and hypertension, to those of the Asian Indians. However, since the degree of insulin resistance may vary between ethnic groups with similar indices of the metabolic syndrome, it is necessary that the degree of insulin resistance should be directly measured in this population. Also, prospective studies designed to define the role of these risk factors in the pathogenesis of CAD in Bahrainis and other Middle East Arabs, with and without diabetes, are needed.

In conclusion, Asian Indians are well-known to have high prevalence of CAD and the associated mortality whether they are resident in the subcontinent or have emigrated to another country. Our comparison of the prevalence of the established risk factors for CAD between Bahraini and Asian Indian male patients seen at the time of diagnosis of
NIDDM showed no difference in the risk factors between the two populations though the Bahraini patients were more obese. These suggest that, if Bahraini men patients are confirmed to have high insulin resistance as is documented in the Asian Indians, they would also probably have as high a risk for CAD as the Indians. Studies to assess the degree of insulin resistance are needed in Bahrainis with or without NIDDM. Also, appropriate intervention to minimize the risk of CAD in both populations would probably be beneficial.

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References


