Original Article
Risk factor assessment of young patients with acute myocardial infarction

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Abstract: The Middle East represents an attractive area for young individuals to seek employment, where they are
exposed to numerous environmental conditions. The pursuit of a better standard of living has driven hundreds to
the Middle East over the recent decades. This influx has also resulted in a predisposition to premature coronary
artery disease (CAD). The aim of this study was to provide an overview of the risk factors in patients younger than
45 years, presenting with acute myocardial infarction (AMI). Out of the 148 patients analyzed, 137 were males
and 11 females. 119 were from South Asia and 29 were Arabs. Their mean age was 36 ± 4.2 years. Smoking was
the most prevalent risk factor in both groups at 67.6%. This was followed by hypertension, family history of CAD,
hyperlipidemia and Diabetes mellitus. There was no significant difference in the clinical risk factor profile between
these two groups. ST elevation myocardial infarction (STEMI) was noted in 67.6%, while 32.4% patients suffered a
Non ST elevation myocardial infarction (NSTEMI). 84.5% received coronary stents, 8.8% had lone thrombus aspira-
tion or balloon angioplasty only, while the rest were treated by conservative medical management or referred for
coronary artery bypass surgery. Conclusion: There is no significant difference in the CAD risk profile between young
South Asian and Arab patients. Preventive strategies focused on risk factor reduction, especially smoking cessation,
should be implemented to protect young adults in the most productive years of their life.

Keywords: Young patients, acute myocardial infarction, smoking

Introduction

CAD is the leading cause of death in the western world [1, 2]. Advancing age is a well-recog-
nized risk factor for acute myocardial infarction (AMI). Studies show a 2 to 10% incidence of
AMI in patients age 45 years or younger [3-7, 10]. Compared to older patients the reported incidence of MI is 8 times lower in younger pop-
ulation. The protection offered by young age is slowly being taken away by increased prevalence of risk factors for CHD in the adolescents
[9]. In search of livelihood the Middle East attracts young people from all over the globe. Different socio-economic and environmental
conditions may predispose them to increased risk of coronary artery disease (CAD). Ignorance of CAD and false sense of security attributable
to young age prevents them from seeking medical advice. Rather than stable or worsening
angina, as seen in older patients, the first onset of angina rapidly progresses to fully evolved
myocardial infarction (MI) in young patients. The vast majority of young patients deny history
of chest pain prior to MI. It is clear that the prevalence is bound to increase. Early recognition
and risk factor modification in this population sub-set is of key importance. These patients
have different risk profile, presentation, and prognosis. The lack of published literature in
young immigrant population regarding CAD is the basis for our review. This information will
help guide physicians for better identifying and targeting primary and secondary preventative
therapies.

Materials and methods

173 patients younger than 45 years of age had
cardiac catheterization at Tawam hospital over
MI in young patients

Table 1. Clinical Variables

<table>
<thead>
<tr>
<th></th>
<th>Asian N = 119</th>
<th>Arab N = 29</th>
<th>All patients N = 148</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age: Mean (SD)</td>
<td>36.3 (4.3)</td>
<td>35.2 (4.4)</td>
<td>36.04 (4.2)</td>
</tr>
<tr>
<td>Gender: n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td>137 (92.6)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td>11 (7.4%)</td>
<td></td>
</tr>
<tr>
<td>Male/Female</td>
<td>111/8</td>
<td>26/3</td>
<td>137/11 (92.6/7.4%)</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>3</td>
<td>11 (7.4%)</td>
</tr>
<tr>
<td>STEMI</td>
<td>81 (68.1%)</td>
<td>19 (65.5%)</td>
<td>100 (67.6%)</td>
</tr>
<tr>
<td>NSTEMI</td>
<td>38 (31.9%)</td>
<td>10 (34.5%)</td>
<td>48 (32.4%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>27 (22.7%)</td>
<td>4 (13.8%)</td>
<td>31 (20.9%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>36 (30.3%)</td>
<td>8 (27.6%)</td>
<td>44 (29.7%)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>22 (18.5%)</td>
<td>11 (37.9%)</td>
<td>33 (22.3%)</td>
</tr>
<tr>
<td>Smoking</td>
<td>80 (67.2%)</td>
<td>16 (51.7%)</td>
<td>96 (67.6%)</td>
</tr>
<tr>
<td>Family history</td>
<td>27 (23.5%)</td>
<td>7 (25.9%)</td>
<td>34 (23.9%)</td>
</tr>
<tr>
<td>Body Mass Index</td>
<td>30.29 (8.48)</td>
<td>32.08 (8.98)</td>
<td>30.93 (8.36)</td>
</tr>
</tbody>
</table>

a two-year period. Only patients from South Asian and Arab origin and with angiographically proven coronary artery disease were included in our study. Medical records were analyzed for the patient’s CAD risk factor profile i.e. history of diabetes, hypertension, hyperlipidemia, family history and smoking. Details of the coronary angiogram, laboratory investigations, and metabolic and cardiac biomarkers were reviewed.

Results

Baseline characteristics

Baseline characteristics and laboratory investigations are shown in Table 1. The Median age was 36.4 ± SD of 4.2 years. 92.6% were male patients, 7.4% female. 80.4% patients were South Asian, while 19.6% were Arabs. 48% of the Arabs were Emiratis. 67.6% of the whole group was smokers, 29.7% had hypertension, and 23.9% had family history of coronary artery disease. Hyperlipidemia was noted in 22.3% and diabetes in 20.9% of patients. The average Body mass Index of the group was 30.39 kg/m². The majority of patients had STEMI, accounting for 67.6% of the total, while the rest 32.4% suffered from NSTEMI.

Clinical variables are summarized in Table 1. The laboratory results are shown in Table 2. The mean complete blood count, kidney function tests were normal, with a slightly elevated lipid profile. Peak CPK and Troponin I was elevated due to the myocardial infarction.

Table 3 shows the vessel involved and type of treatment received. Single vessel disease was noted in 85.1% of the patients, two vessels in 11.5% and three-vessel disease was seen in 3.4% patients. The Left anterior descending artery was the most common single vessel involved at 48% followed the right coronary involved 18.2% of the time and Left circumflex artery 17.6%. 42.6% patient’s received drug eluting stents, 41.9% received bare metal stents, and while 8.8% had either lone thrombus aspiration or balloon angioplasty only. Conservative medical management and coronary artery bypass surgery was recommended for 4.1% and 2.7% patients respectively.

Discussion

Studies have shown substantial differences in risk factors, management and outcomes of myocardial infarction among young and old patients [10]. Compared to healthy, age matched control subjects, young patients with myocardial infarction have a higher percentage of smoking, and other coronary artery disease risk factors [11-14]. This has not been yet addressed in the young immigrant population of UAE.

Stable angina and multivessel disease is uncommon in the young [15]. The first onset of angina in the young rapidly progresses to fully
MI in young patients

Table 3. Vessel Involved and treatment

<table>
<thead>
<tr>
<th></th>
<th>Asian N = 119</th>
<th>Arab N=29</th>
<th>All patients N = 148</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Anterior Descending</td>
<td>57 (47.9%)</td>
<td>14 (48.3%)</td>
<td>71 (48%)</td>
</tr>
<tr>
<td>Right Coronary Artery</td>
<td>23 (19.3%)</td>
<td>4 (13.8%)</td>
<td>27 (18.2%)</td>
</tr>
<tr>
<td>Left Circumflex</td>
<td>19 (16%)</td>
<td>7 (24.1%)</td>
<td>26 (17.6%)</td>
</tr>
<tr>
<td>Left Main</td>
<td>2 (1.7%)</td>
<td>0 (0%)</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td>2 Vessel</td>
<td>13 (9.9%)</td>
<td>4 (13.8%)</td>
<td>17 (14.9%)</td>
</tr>
<tr>
<td>Three Vessel</td>
<td>5 (4.2%)</td>
<td>0 (0%)</td>
<td>5 (3.4%)</td>
</tr>
<tr>
<td>DES</td>
<td>42 (35.3%)</td>
<td>21 (72.4%)</td>
<td>63 (42.6%)</td>
</tr>
<tr>
<td>BMS</td>
<td>55 (46.2%)</td>
<td>7 (24.1%)</td>
<td>62 (41.9%)</td>
</tr>
<tr>
<td>Thrombus aspiration only</td>
<td>12 (10.1%)</td>
<td>0 (0%)</td>
<td>12 (8.1%)</td>
</tr>
<tr>
<td>Medical management</td>
<td>5 (4.2%)</td>
<td>1 (3.4%)</td>
<td>6 (4.1%)</td>
</tr>
<tr>
<td>Coronary artery bypass surgery</td>
<td>4 (3.4%)</td>
<td>0 (0%)</td>
<td>4 (2.7%)</td>
</tr>
<tr>
<td>Balloon angioplasty only</td>
<td>1 (0.8%)</td>
<td>0 (0%)</td>
<td>1 (0.7%)</td>
</tr>
</tbody>
</table>

evolved MI [16]. Up to one third of the young patients deny history of chest pain prior to MI [17]. In Contrast, older patients usually have multivessel disease [12, 18-23]. The Long-term prognosis of patients depends upon the number of diseased vessels, and the degree of LV dysfunction [24-26]. Our study was in line, showing the majority having first episode of acute coronary syndrome without prior symptoms and 85% had single vessel disease. The lack of warning signs stresses the need for primary preventative measures. Contradictory data exists in literature regarding the frequency of coronary artery involved in AMI in young individuals [18, 19, 27-29]. Our study shows the left anterior descending to be involved 48% of time, followed by and equal RCA and LCx involvement at approximately 18%.

Smoking is traditionally recognized as the most common risk factor for heart disease and is associated with MI at young age [20, 29]. In patients with PCI proven CHD the prevalence of smoking is higher among patients younger than age 45 compared to over 60 (58.7 vs. 43%) [30]. History of smoking is has been reported in 73% to 90% of young patients with MI [11-13, 19-21, 28, 29]. The high incidence of smoking noted in our patients was 68%. It was equally high in the South Asian and Arab patients. Our data and others [32] support the need of promoting smoking prevention programs in the young population.

Oral contraceptives in combination with smoking have been associated with MI in young women [33, 34]. Fortunately compared to the west, where smoking in girls has been shown to be more prevalent and persistent (they smoker for longer time) reaching up to 9% [35], there was no history of cigarette smoking in our female patients.

Metabolic syndrome and insulin resistance is found in two thirds of the young patients with MI [36]. Obesity is on the rise worldwide with a threefold increase in UK in the past two decades [35, 37, 38]. Lipid abnormalities, insulin resistance and obesity are more common in patients with family history of premature CHD [39]. Our patient population somewhat differs, many of these young people are physically active by virtue of their professions of being manual laborers. The average BMI at 30.1 kg/m² does not seem to be the major contributing factor to the MI. In patients with known CAD, studies have shown an inconsistent incidence of hyperlipidemia and hyper-triglyceridemia in young vs. older patients [20, 21, 31, 34, 40]. Our study showed 30% patients were hypertensive, 22% had hyperlipidemia and 21% were diabetics.

Compared to normal subjects, family history of cad is prevalent patients with known CAD [20, 31]. This finding is inconsistent, as other studies do not find the same association [12, 19]. In a study by Zimmerman et al, family history of CAD was more common only in young men [40], while in young patients with MI, positive family history of premature coronary artery disease was found in 39% participants [15]. Family history of cad was noted in 24% of our patient population. This is somewhat equal to generally found in normal population.

Conclusion

MI at youthful (early) age raises the disconcerting/alarming/disturbing potential of malignant atherosclerosis disease and subsequent adverse prognosis. It has devastating effects on patients, their families and community at large. Risk factor modification is a challenging task in young patients. A particular challenge
that remains for the health care worker is the high/alarming incidence of smoking noted in our young patients. Smoking is traditionally recognized as the most common risk factor for heart disease. Preventive educational programs along side with smoking cessation clinics need to be established. Smoking cessation, diabetic and cholesterol education should be a priority of the medical community. If not treated appropriately, long-term mortality may reach 30%. The limitation for the current study is that this is a retrospective study.

Disclosure of conflict of interest

None.

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