Clinical and angiographic characteristics of young Egyptian women with acute coronary syndromes

Abstract

Introduction: Although acute coronary syndrome (ACS) mainly occurs in individuals >50 years, younger adults can be affected as well. Young patients represent 2-10% of patients with ACS, most of them are men while women constitute about 25% of this population.

Methods: Patients with ACS <45 years were included and were subjected to history taking, clinical examination, ECG, echocardiogram, and lab investigations including cardiac enzymes, renal functions, complete blood count, lipid profile, blood sugar, complete liver functions.

Invasive management or medical management was determined depending on the diagnosis of the patient, his condition and the decision of the attending physician. For patient who underwent coronary angiography, decision of PCI and stenting and whether culprit lesion or complete revascularization was left for the operator.

Results: The study included 306 men and 92 women. There was no significant difference regarding hypertension, dyslipidemia, family history of ischaemic heart disease or chronic kidney disease. Diabetes was significantly higher in women (40.2%) and body mass index was higher in women while smoking was significantly higher in men (66%). STEMI was more in men and unstable angina more in women.

Conclusion: In young Egyptian women with ACS, they have more incidence of diabetes and higher BMI compared to men with less incidence of smoking. They present more with unstable angina compared to more STEMI in men.

Keywords: acute coronary syndrome, young Egyptian women

Abbreviations: ACS, acute coronary syndrome; Dm, diabetes mellitus; AMI, acute myocardial infarction; TC, total cholesterol; LDL, low-density lipoprotein; HDL, high-density lipoprotein; BMI, Body mass index

Introduction

Although acute coronary syndrome (ACS) mainly occurs in individuals >50 years, younger adults can be affected as well.1 In the recent decades, younger women have an increased incidence of AMI (acute myocardial infarction) which may be attributed to the increased incidence of diabetes Mellitus (DM), metabolic syndrome and also, the increased level of stress and anxiety.2 The leading cause of death in women either in USA or globally is cardiovascular disease.3,4 The care of women with cardiovascular disease especially, acute cases, show disparity even in the same income, education level and care taken.5 Different studies have used the age between 35 and 55 years as the definition of young age, so, it seems reasonable to consider 45 years as the limit for young age.6 Young patients represent 2-10% of patients with ACS, most of them are men while women constitute about 25% of this population.7,8

In the context of ACS/MI gender difference do exist, some of these differences can be explained by the fact that the pathophysiological mechanisms may be different between men and women.9 The syndrome X, in which there is evidence of myocardial ischaemia in non-invasive tests with normal coronary angiography, is more frequent in females and may be a marker of of microvascular dysfunction. Virmani et al.9 was the first to describe plaque ulceration in the setting of AMI and found it to be more common in pre-menopausal women rather than the elderly. Thrombus formation rather than obstructive CAD is more common in women than men presenting with ACS.10

AMI in absence of obstructive disease, which is more common in women, may be attributed to coronary spasm, microvascular dysfunction and spontaneous coronary artery dissection. Atypical presentation of ACS is more common in women than men, especially young ones resulting in underestimation of the severity and longer time to proper diagnosis and undertreatment.11-13 Young women with ACS represent a very special group given the protective effect of estrogen. The clinical and angiographic characteristics of this group in the Egyptian population are not well known.

Methods

This is a cross sectional observational study for patients with ACS admitted to Tanta university hospital, Elshorouk specialized hospital, IbnSina Specialized hospital between January 2017 and May 2019. A total of 3312 patients with acute coronary syndrome were admitted, of which 430 were 45 years or less and women were 116 patients. Of 116 women only 92 patients accepted to participate in the study.

Conclusion: In young Egyptian women with ACS, they have more incidence of diabetes and higher BMI compared to men with less incidence of smoking. They present more with unstable angina compared to more STEMI in men.
patients. STEMI was defined according to ACCF/AHA guidelines as “new ST-segment elevation at the J-point in at least 2 contiguous leads ≥2mm in men, =1.5mm in women in leads V2 to V3, or =1mm in other contiguous chest leads or the limb leads.” As per the ACC/AHA guideline statement, the absence of ST elevation on ECG with typical symptoms of angina identifies the patients as having non-ST segment elevation -ACS. The latter, can be subclassified based on the results of cardiac biomarkers. If elevated and the clinical context is appropriate, the patient is considered to have NSTEMI; otherwise, the patient is diagnosed as unstable angina. All patients underwent history taking, clinical examination, ECG, echocardiogram, and lab investigations including cardiac enzymes, renal functions, complete blood count, lipid profile, blood sugar, complete liver functions.

Hypertension was defined as having a history of hypertension or systolic/diastolic blood pressure ≥140/90 mmHg. Diabetes (type 1 or 2) was defined as history of diabetes or fasting plasma glucose >126mg/dL. We used low-density lipoprotein (LDL) (>130mg/dL), total cholesterol (TC) (>200mg/dL), and high-density lipoprotein (HDL) (<40mg/dL) as cut off values to diagnose dyslipidemia as defined in the NCEP/ATP 3 guidelines. Body mass index (BMI) was calculated as weight (kg) /height squared (m^2). Patients were considered overweight or obese if they had a BMI of 25-29.9 or ≥30kg/m² respectively. Invasive or medical strategy was based on the diagnosis of the patient, his condition and the decision of the attending physician. In patients who underwent coronary angiography, decision of PCI and stenting and whether culprit-lesion only or complete revascularization was left for the operator.

**Results**

Table 1 shows comparison between males and females regarding the risk factors for coronary artery disease, where females tend to have stress more than males before the attack (31% of male and 41.3% of females with p value 0.06). There was no significant difference regarding hypertension (39.2% of males and 46.7% of females), dyslipidemia (40.8% for males and 47.8% for females), family history of ischaemic heart disease (33% for male and 35.9% for females) and CKD (1.3% of males and 2.2% of females) between males and females. There was a significant difference between females and males regarding the incidence of diabetes which was 40.2% in females and 29.1% in males with a p value of 0.044. Similarly, BMI was significantly higher in females than males with the incidence of overweight and obese patients in females 38% and 43.3% respectively while it was 34% and 32% in males respectively with a p value of 0.014.

|                          | Male (n=306) | Female (n=92) | X²   | P-value |
|--------------------------|-------------|---------------|------|---------|
| Stress                   |             |               |      |         |
| Yes                      | N=95        | 38            |      |         |
| % 31.0%                  | N=211       | 54            | 3.346| 0.067   |
| No                       | N=120       | 43            |      |         |
| % 69.0%                  | N=186       | 49            | 1.656| 0.198   |
| HTN                      |             |               |      |         |
| Yes                      | N=89        | 37            |      |         |
| % 29.1%                  | N=186       | 49            | 4.052| 0.044*  |
| No                       | N=125       | 44            |      |         |
| % 70.9%                  | N=217       | 55            |      |         |
| Diabetes                 |             |               |      |         |
| Yes                      | N=181       | 48            | 1.409| 0.235   |
| % 40.8%                  | N=181       | 48            |      |         |
| No                       | N=202       | 3             |      |         |
| % 59.2%                  | N=202       | 3             |      |         |
| Current smoker           |             |               |      |         |
| % 66.0%                  | N=125       | 44            |      |         |
| Smoking                  |             |               |      |         |
| Ex. smoker               | N=33        | 0             | 159.146| 0.001*      |
| % 10.8%                  | N=33        | 0             |      |         |
| Non smoker               | N=71        | 89            |      |         |
| % 23.2%                  | N=71        | 89            |      |         |

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The incidence of smoking was significantly higher in males than females with 66% of males were current smokers compared to 3.3 of females with a p value of 0.001. There was no significant difference between females and males regarding the presenting symptom of the ACS, despite the fact that more females present with palpitation (18.5% vs 12.7%), dyspnoea (37% vs 29.4%) and dizziness/confusion (5.4 vs 3.6%), compared to males Table 2. There was a trend for STEMI to be the presenting condition in males than females (46.1% vs 35.9%) with a p value of 0.08, while there was no significant difference regarding NSTEMI (31% vs 29.3%). Unstable angina was the most frequent presenting symptom in females and was significantly higher than males (34.8% vs 22.9%) with a p value of 0.022, Table 3.

**Table 2** Comparison between males and females regarding the presenting symptoms

| Symptom          | Male (n=306) | Female (n=92) | X²   | P-value |
|------------------|--------------|---------------|------|---------|
| Chest pain       |              |               |      |         |
| Yes              | N 285        | 83            |      |         |
| %                | 93.1%        | 90.2%         | 0.865| 0.352   |
| No               | N 21         | 9             |      |         |
| %                | 6.9%         | 9.8%          |      |         |
| Dyspnoea         |              |               |      |         |
| Yes              | N 216        | 58            |      |         |
| %                | 70.6%        | 63.0%         | 1.923| 0.166   |
| No               | N 90         | 34            |      |         |
| %                | 29.4%        | 37.0%         |      |         |
| Palpit           |              |               |      |         |
| Yes              | N 267        | 75            |      |         |
| %                | 87.3%        | 81.5%         |      |         |
| No               | N 11         | 5             |      |         |
| %                | 12.7%        | 18.5%         |      |         |
| Dizz/Confusion   |              |               |      |         |
| Yes              | N 295        | 87            |      |         |
| %                | 3.6%         | 5.4%          | 0.621| 0.431   |
| No               | N 295        | 87            |      |         |
| %                | 96.4%        | 94.6%         |      |         |
There was no difference regarding the location of STEMI between females and males with 54.5% of females presented with anterior STEMI vs 58.2%, 6.1% of females presented with lateral STEMI vs 7.8% and 39.4% presented with inferior STEMI compared to 34%, Table 4. Table 5 shows no significant difference between females and males regarding the management strategy of STEMI group of patients where 54.5% of females were managed with PPCI vs 62.4% of males, 27.3% received fibrinolytic therapy vs 22.7% and 18.2% received neither vs 14.9%. In the group of patients with NSTEMI/UA, we found that females are more significantly receiving PCI than males (52.4% vs 28.5%), but because of the small sample volume of this group (21 patients of which 11 had PCI) this result can be discarded. There was no significant difference between females and males who underwent coronary angiography regarding the number of vessels affected but more females have normal or no-significant lesions (33.3% vs 27.8%) with no significant difference. In patients with single vessel CAD, there was no difference between females and males regarding the affected vessel, where in both LAD was the most commonly affected vessel (62.5% vs 64.8).

Discussion

Ischaemic heart disease represents a major public health problem in the modern world. Only a small percentage (<10%) of patients are below the age of 45 years.15,16 In developed countries, the actual prevalence of the disease, in men and women in the age group 35–44 years was found to be 0.5% and 0.18%, respectively. There are many underlying mechanisms such as rupture of a vulnerable plaque or erosion of the endothelial layer, hypercoagulable states, coronary artery spasm, inflammation, etc. Atherosclerosis remains the major cause of ACS in the young.17 Atherosclerosis may begin as early as the first decade of life and considerable lesions in coronary arteries may be apparent by the age of 25–30 years.18

Approximately 10% of patients with ST-segment–elevation myocardial infarction (STEMI) were young patients and 2% of these patients were women.1 Our study conducted in the young Egyptian population presented with ACS showed that 26.9% of patients were females. Diabetes and higher BMI were significantly higher in females than males while smoking was significantly higher in males. Chest pain was the main presenting symptom in both young men and women, despite palpitation; dizziness and dyspnoea were more frequent in women. STEMI was more common as the presenting...
Clinical and angiographic characteristics of young Egyptian women with acute coronary syndromes

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Conflicts of interest
The authors declare there are no conflicts of interest related to the article.

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symptom in men while unstable angina was the main presenting symptom in women. Women tend to have more stress before the event than their men counterparts. There was no difference between both groups regarding the location or the management strategy for STEMI (62.4% vs 54.5% of men and women received primary PCI as the management strategy, respectively).

In patients with single vessel disease LAD was the most commonly affected vessel in both men and women (64.5% vs 62.8%). More women had PCI in the NSTEMI/UA group than males (52.4% vs 28.5%) which can be explained by the fact that the number of women in this group was very small, only 21 women of which 11 had PCI. Ricci B et al., found that smoking and high BMI are independent risk factors in the young which is similar to our results but in the Egyptian population, smoking was significantly higher in males than females and BMI was significantly higher in women than men. In accordance with our results, they observed less frequency of multi-vascular disease (it was 9.5% in men and 7.7% in women in our study). Similarly, the left anterior descending artery (LAD) was the most commonly affected vessel.

Nagamalesh UM et al. studied the clinical criteria of young Indian women presenting with ACS, they similarly found an incidence of about 40% of diabetes and unlike our results they found a high incidence of dyslipidemia in young Indian women reaching around 70% compared to 47% in our study and both studies showed low incidence of smoking and CKD in young women with ACS. Chest pain was the main presenting symptom like our study. Most of patients with STEMI received primary PCI and LAD was the most commonly affected vessel, which is similar to our findings.

The INTERHEART study found that young women with myocardial infarction are more likely to be smokers, diabetics, hypertensive with abdominal obesity while our study showed young women with ACS have more diabetes, and higher BMI but less likely to be smokers than men. El-Husainy F et al., conducted a study in Saudi young population presented with ACS, they found that smoking and dyslipidemia are common risk factors in the young (smoking was significantly higher in young men than young women in our study) and STEMI was more common than NSTEMI which is similar to our results. Likewise, they found that LAD is the most commonly affected vessel and normal coronary arteries were found in 23% of patients (28% in men and 33% of women in our study).

Bhardwaj R et al. examined young patients with myocardial infarction and found that smoking, hypertension, dyslipidemia are common risk factors in this group of patients and only one out of 124 patients was female (116 females out of total of 430 in our study) and they also had 10% of patients with normal coronary arteries compared to 28% of males and 33% of females in our study and similarly LAD was the most commonly affected artery.

Conclusion
ACS in the young Egyptian population is a rising problem, and identification of the risk factors and proper patient evaluation and early diagnosis can help to reduce its burden. Smoking in males and high BMI in females are the most common risk factors in this young group of patients.

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