Coronary artery disease in young adults (Clinical and angiographic characterization)

Mohamed Mahmoud[1], Mahmoud Ahmed A Elbaset[2], Osama Osman[3], Mahmoud Ahmed Mahmoud[4]

[1] Assistant Professor, Department of Cardiovascular Medicine, Faculty of Medicine, Al-Azhar University, Assuit, Egypt

[2, 3] Lecturer, Department of Cardiovascular Medicine, Faculty of Medicine, Al-Azhar University, Assiut, Egypt

[4] Resident, Department of Cardiovascular Medicine, Sohag Cardiology and Digestive System Center, Sohag, Egypt

Abstract

Objectives: To assess the risk factors profile, clinical presentation and angiographic characteristics of coronary artery disease (CAD) in young patients

Methods: A total of 50 patients aged 40 years or less, diagnosed as patients with CAD were included in this study. Demographic characteristics, risk factor profile, laboratory test results, electrocardiographic and echocardiographic findings and coronary angiography findings were assessed.

Results: The mean patient age was 33.82±3.7 years. Men made up 80% of the study sample, and the proportion of rural area residents was 60%. The most prevalent conventional cardiovascular risk factor was smoking (62%), followed by dyslipidemia (46%), obesity (42%), positive family history of CAD (40%) and hypertension (24%). Among young patients the most common presentation (54%) was ST segment elevation myocardial infarction (STEMI). Angiographically normal coronary arteries were found in 34% of CAD patients. Single-vessel disease was identified in 64% of significant CAD patients. The most common location of significant atherosclerotic coronary lesions was the left anterior descending artery (62%) followed by the right coronary artery (25%).

Conclusion: The population of young patients with CAD is predominantly male and rural. The rates of CAD risk factors in young adults are high and the most important risk factors are smoking, dyslipidaemia, obesity and positive family history of CAD. STEMI presentation and Single vessel disease were predominant in young patients. Further studies on CAD in young adults are required, particularly in larger patient populations.

Keywords: coronary artery disease, young age, coronary angiography, risk factors

Introduction

Though patients aged 40 or less account for only a minor proportion of all patient with acute coronary syndromes (ACS), the young patient is of a particular interest because a healthy person in the prime of life may die or become disabled without warning [1].

It has been estimated that less than 10% of all individuals presenting with documented CAD are under age of 40 years [2]. Although the aetiology of CAD in young subjects is related to coronary atherosclerosis in 80% of cases, a number of differences regarding both the risk factor profile and clinical and angiographic characteristics exist in comparison to older patients [3].

Previous data from different studies have indicated that smoking, hypertension and dyslipidemia if present in young individuals play an important role in the development of premature CAD [4].

Angiographic data regarding the extent and severity of CAD in the very young patients with manifest CAD is very limited. The limited data seem to suggest higher prevalence of single vessel CAD and less of triple vessel CAD in the young. A study from the UK found more complex stenosis morphology in the younger patients compared to the older [5].

Aim of the study

The Aim of this study is to assess the risk factor profile, clinical presentation and angiographic characteristics of CAD in young patients.

Patients and methods

We studied 50 patients aged 40 years or less, diagnosed as patients with CAD, outpatient or admitted in Cardiology Department, Azhar Assuit university hospital and Sohag Cardiology and Digestive system center. between January 2016 and June 2017.

Criteria for Exclusion

Patients more than 40 years, patients with valvular heart disease, patients with congenital heart disease, patient with hypertrophic cardiomyopathy and end stage liver and renal disease.

All patients in this study were subjected to

Full History taking

Especially history of risk factors for CAD as: hypertension (HTN), diabetes mellitus (DM), positive family history of CAD, smoking, and dyslipidemia.

Complete physical examination
General and local cadiac examinations.

Laboratory investigations
Kidney & liver function, co-agulation & lipid profiles, CBC, and cardiac enzymes.

Electrocardiography
12 lead ECG for all patients to diagnose each type of ACS.

Echocardiography
For assessment of left ventricular systolic function, diastolic function, wall motion abnormalities and valvular structure and function.

Coronary angiography
All coronary angiographies assessed by an experienced operator blinded to all other clinical data. The angiography assessed for the severity and distribution of coronary affection where stenosis ≥ 50% in the diameter of the left main coronary artery or stenosis ≥ 70% in one or more of the major epicardial vessels or their main branches was considered

clinically significant [6].

Results
Demographic data of the study group

Table 1: Demographic data of the study group: shows that the mean of age in our study was 33.82±3.70. 80% were males and 20% were females, as regards education 82% were educated, 60% were from rural areas and 40% were from urban areas.

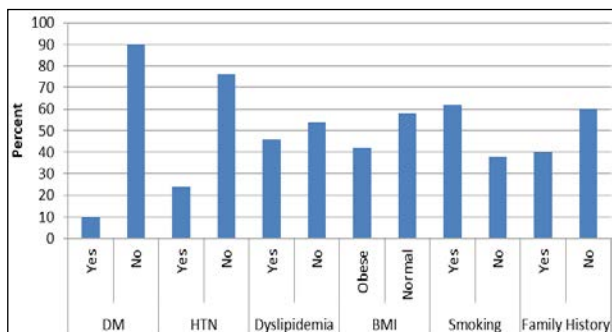|	No (n= 50)	%
Age		
35 years<	24	48
years 35≥	26	52
Mean±SD (Range)	33.82±3.70 (23 – 39)	
Sex		
Male	40	80
Female	10	20
Education		
Illiterate	9	18
Educated	41	82
Residence		
Rural	30	60
Urban	20	40
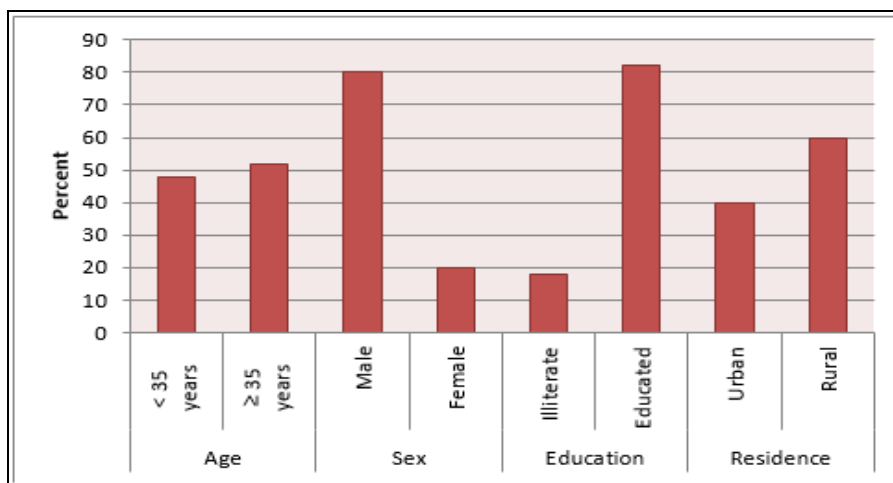
Fig 1: Demographic data of the study group
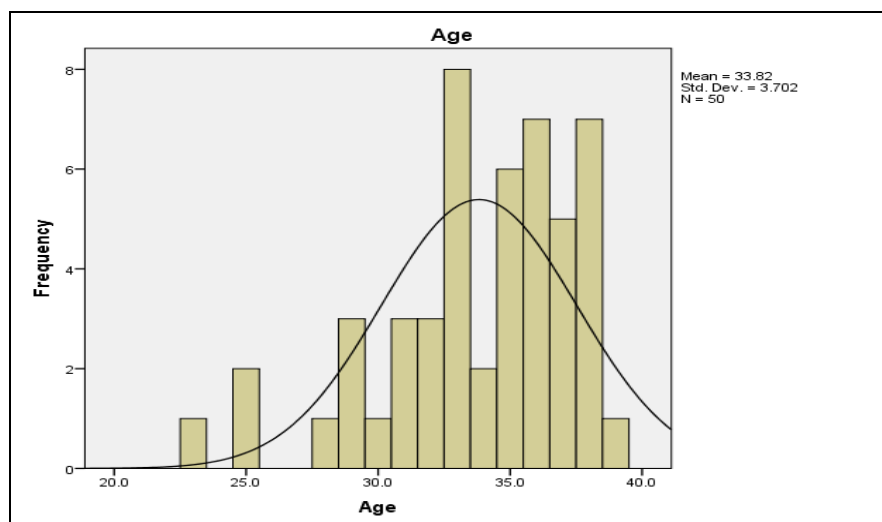
Fig 2: The mean of age in our study

Risk factors

Table 2: Risk factors: shows that only 10% of our study group were diabetic, 24% were hypertensive, 62% were smokers, 46% had dyslipidemia. Regarding BMI, 42% were obese, 40% had positive family history.

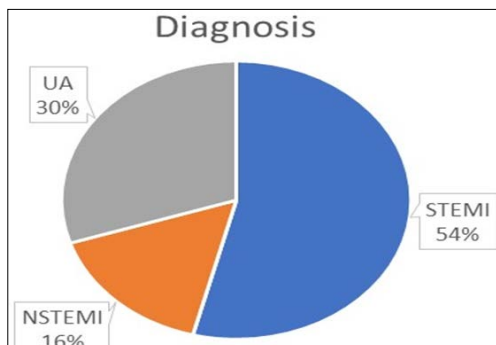|	No (n= 50)	%
Diabetes		
Yes	5	10
No	45	90
Hypertension		
Yes	12	24
No	38	76
Smoking		
Yes	31	62
No	19	38
BMI		
Obese	21	42
Normal	29	58
Family History		
Yes	20	40
No	30	60
Dyslipidemia		
Yes	23	46
No	27	54

Fig 3: Risk factors percentage

Diagnosis

Table 3: Diagnosis shows that 54% of our study group diagnosed as STEMI, 30% were UA, and 16% were NSTEMI.

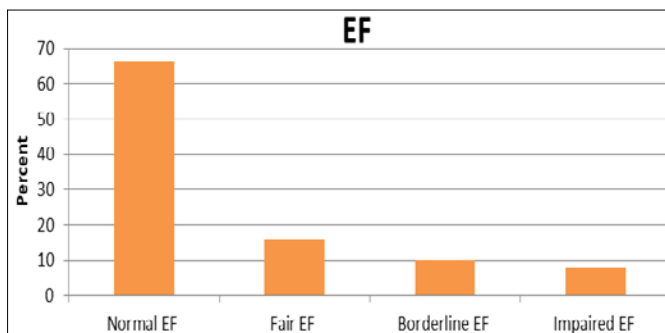|		No (n= 50)	%
	Stemi	27	54
Diagnosis	Nstemi	8	16
	UA	15	30

Fig 4: Diagnosis

Echocardiographic data

Table 4: Echocardiographic data: shows that 66% of our study group had normal EF, 16% had fair EF, 10% had borderline EF and 8% had impaired EF. 78% had RWMA.

	No(n= 50)	%
Normal EF (≥ 55%)	33	66
Fair EF (50:54%)	8	16
Borderline EF (40:49	5	10
Impaired EF < (40%	4	8
RWMA	39	78
No RWMA	11	22

Fig 5: Echographic findings (left ventricular ejection fraction)
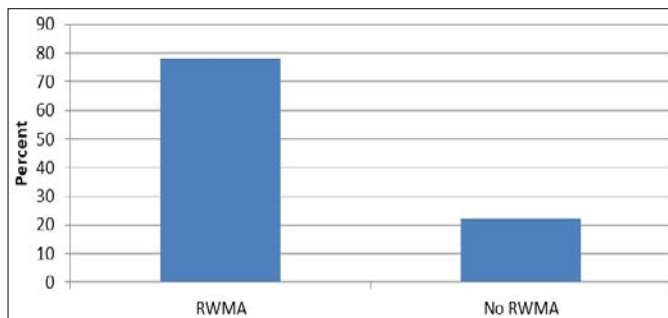
Fig 6: Regional wall motion abnormalities percentage.

Coronary angiography data

Table 5: Coronary angiography data: shows that 66% of our patients were atherosclerotic, 64% had single vessel affected, 32% had multi vessel affected. Regarding type of affected vessel, 62.5% was LAD, 12.5% was LCX, and 25% was RCA.

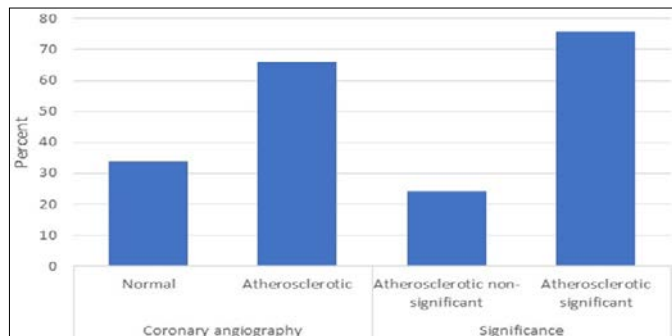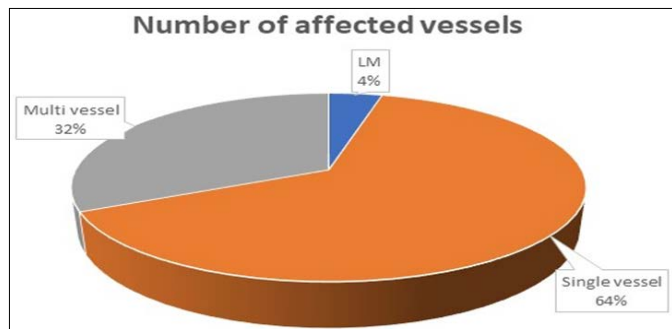| Coronary angiography	No (n= 50)	%
Normal	17	34
Atherosclerotic	33	66
Significance	No (n= 33)	%
Atherosclerotic non-significant	8	24.2
Atherosclerotic significant	25	75.8
Number of affected vessel	No(n= 25)	%
LM	1	4
Single vessel	16	64
Multi vessel	8	32
Type of affected single vessel	No (n= 16)	%
LAD	10	62.5
LCX	2	12.5
RCA	4	25

Fig 7: Angiographic findings
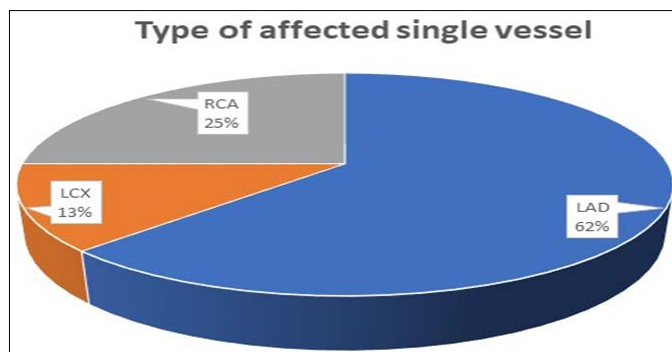

Fig 8: Number of affected vessels

Fig 9: Type of affected single vessel

Discussion

In the present study the mean age was (33.8) years old while it was (35.1) years in a study done by (Maroszyńska *et al*, 2016) on young CAD patients in Poland [7].

In the present study (80%) of patients belong to male sex. Our results are in agreement with a study done by (Hussein *et al*, 2013) on young patients with ACS (75% were males) [8].

In the present study, the most common risk factors were smoking (62%), dyslipidemia (46%), obesity (42%) and family history (40%) while hypertension (24%) and diabetes mellitus (10%) are less common risk factors than in old patients.

Our results are in agreement with study done by (Maroszyńska *et al*, 2016) in which Risk factor analysis revealed smoking to be present in (71.5%) of population. Family history was present in (52.9%) percent of population. As compared to diabetes mellitus (6.3%), hypertension was present in (49.4%) of patients. hyperlipidemia was seen in (72.5%), (15.9%) were obese (35.6%) were overweight [7].

In a study done by (Santosh *et al*, 2017) Smoking was the most common risk factor (77.4%), hyperlipidemia being the second common risk factor (78.5%), whereas 46.8% of the patients had a family history of premature CAD. Hypertension was seen in 229 patients (20.5%) while 191 patients had diabetes (17.2%). and obesity in 437 (39.1%) patients [9].

In the present study, most of patients presented by STEMI were (54%) while presentation with NSTEMI was in (16%) of patients and UA present in (30%).

Our results are in agreement with a study done by (Maroszyńska *et al*, 2016) in which presentation by STEMI was (52.8%) while NSTEMI was (17.6%) and UA was (29%) [7].

A study done by (Andreas *et al*, 2011) on 76 hospitals treating ACS enrolled 28,778 patients 35 years old or younger with ACS in the AMIS Plus cohort, (73.1%) of young patients showed STEMI whereas NSTEMI/UA were in (26.9%) [10].

The present study, shows that (66%) of studied patients had normal left ventricular (LV) function, (16%) had fair (LV) function, (10%) had borderline (LV) function and (8%) had impaired (LV) function. And also shows that (78%) of the studied patients had regional wall motion abnormalities (RWMA).

Our results are in agreement with (Zhahid *et al*, 2014) study in which (82%) of patients had echo documented RWMA [11].

Our results are in agreement with (Teixeira *et al*, 2010) study which shows that (66.1%) of studied patients had normal (LV) function and (14.5%) had mild (LV) dysfunction, (10.5%) had moderate (LV) dysfunction and (8.9%) had severe (LV) dysfunction [12].

The present study, show that (34%) had normal coronaries while (16%) had atherosclerotic non-significant lesions and (64%) had single vessel disease (SVD), (32%) had multivessel disease (MVD) and (4%) had left main (LM) disease. Regarding type of affected vessel, (62.5%) was LAD, (12.5%) was LCX, and (25%) was RCA.

Our results are in agreement with (Maroszyńska *et al*, 2016) study which showed that (37.2%) had normal coronaries while (13.4%) had atherosclerotic non-significant lesions and (61.9%) had SVD, (32%) had MVD and (3.4%) LM disease. Regarding type of affected vessel, (61.6%) was LAD, (11%) was LCX, and (27.4%) was RCA [7].

Our results are in agreement with study done by (Hussein *et al*, 2013) which showed that the LAD was the most commonly involved vessel by occlusive lesion in the young patients (41.5%) followed by the RCA, LCX and LM artery respectively. It was found that a normal coronary arteries and SVD involvement were more common in the young patients group [8].

Our results are in agreement with (Zhahid *et al*, 2014) study which showed that SVD was the most common angiographic finding in the study group. (67%) patients had SVD & (33%) had MVD. LAD was the most common artery involved followed by RCA and LCX. No patient had involvement of LM coronary artery [11].

In a published review done by (Bhardwaj *et al*, 2014) Significant CAD was found in (70.96%) patients, (10.48%) had normal coronaries. SVD was seen in (51.3%) patients, MVD in (33%) patients. LAD was the commonest vessel involved (62.4%) [13].

In a study done by (Santosh *et al*, 2017). About (80.5%)

patients had obstructive CAD, (5.2%) had normal angiogram. SVD was observed in (71.5%), MVD in (22.7%) and LM in (3.2%). LAD was the affected vessel in 58.1%, RCA in 28.2% and the LCX in 13.7% patients [9].

Conclusion
- The population of young adults with CAD is predominantly male, rural, and characterized by a low socioeconomic status.
- The overall profile of risk factors important for the etiology of CAD in young subjects. The severity of specific risk factors and their individual contribution to the development of CAD in patients below 40 years of age is different as compare to old patients. Smoking is the most prevalent cardiac risk factor in the young patients followed by hyperlipidemia, obesity and positive family history.
- STEMI presentation were predominant in young patients, followed by unstable angina and least commonly NSTEMI.
- Echographic findings in most young patients had normal left ventricular function with echo documented regional wall motion abnormality.
- Coronary angiographic findings and outcomes are also different compared to older patients. CAG mostly reveals either normal coronary arteries or Single vessel disease. The left anterior descending artery was the most commonly involved vessel by occlusive lesion in the young patients.

Limitations
- It included only two medical center, do not represent the whole community.
- The number of our study population is not large enough to consolidate our findings.
- It would also be interesting to follow up the patients for prognostic significance. Large-scale prospective studies are needed to obtain further information

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