

# Acute coronary syndrome among young patients in Saudi Arabia (Single center study)

## Abstract

**Objective:** We sought to study the clinical profile, presentations and in hospital outcome of acute coronary syndromes (ACS) among young patients 18-45 years of age presenting to King Faisal Cardiac Center in the eastern province of Saudi Arabia.

**Methods:** Retrospective Single center study of all patients 45 years or younger who presented to King Faisal cardiac center with acute coronary syndrome from the period between august 2014 till December 2017. All data were obtained from health informatics system. Descriptive data of risk factors, clinical presentation, angiographic results and in hospital outcome were reported.

**Results:** During the study period 1242 patients were admitted with ACS among them 56 patients (4.5%) were forty five or younger. Majority were males 52 patients 92 %. Smoking and dyslipidaemia were seen among 78% and 28% respectively. Mean age was 38 years (SD±5.3). STEMI was the presenting syndrome among thirty two patients 57% and NSTEMI among 30 % of the patients. Normal coronaries were seen in 11 patients 23%. The left anterior descending artery was the infarct related artery in 19 patients 47%. Many patients had only single vessel disease.

Percutaneous intervention was performed in 27 patients 67%. No adverse in hospital and 30 days events were encountered.

**Conclusion:** Smoking is a prevailing risk factor among young patients presenting with ACS. Majority have a favourable short term outcomes.

**Keywords:** Acute Coronary Syndrome, Myocardial infarction in the young

Volume 12 Issue 3 - 2019

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**Received:** May 18, 2019 | **Published:** June 12, 2019

## Introduction

Acute coronary syndrome represents a major health problem all over the world. It's mainly considered a disease of middle aged and elderly, however when it manifest among young patients it carries significant morbidity and financial burden for the patient, His family and society.<sup>1-4</sup> 5-10% of myocardial infarctions (MI) occur in patients younger than 46 years of age.<sup>5-7</sup> Saudi Arabia is undergoing a major transformation as a young nation with adoption of a western life style we have seen an increased prevalence in the cardiovascular disease risk factors.<sup>8,9</sup> The 2030 vision of Saudi Arabia is aspiring to improve the health care systems through collection of relevant data in order to meet and address challenges and deliver preventive measures and improve access to health care systems. 66.4 per cent of the total population in Saudi Arabia is aged 15-54, with Saudis making up 60 per cent of this age.<sup>10</sup> Due to paucity of information in young patients 45 years or less this study aims to identify the prevalence of acute coronary syndrome in young (<45 years old) patients presenting King Abdulaziz Medical city-Jeddah, Saudi Arabia. Our objectives include identifying the pattern of clinical presentation, affected coronary arteries, the risk factors and the short term outcomes of acute coronary syndrome.

## Methods

This is a single center study conducted at King Faisal cardiac center which is located in the city of Jeddah. It's a tertiary center with an intermediate to high case volume of acute coronary syndrome admissions it's a retrospective data review of health information system of all patients who were admitted with acute

coronary syndrome diagnosis during the period from august 2014 till December 2017 who were above the age of 18 and 45 years of age or younger and fulfil the diagnosis of acute coronary syndrome with acute chest pain with or without ECG changes and with or without positive biomarkers according to the most recent American college of cardiology definition.<sup>11</sup> All patients with STEMI, NSTEMI or unstable angina have been studied. Patients with congenital or valvular heart disease were excluded. All patients underwent full history taking and appropriate physical examination the following investigations were undertaken:

- CBC
- Urine and serum sugar
- Haemoglobin A1C
- Renal Profile
- Liver profile
- Serial high sensitivity Troponins
- Fasting lipid profile for dyslipidaemia
- ECG and chest X-ray
- Echocardiography for the left ventricular function and evidence of CAD
- Coronary CT angiogram (those with negative biomarkers)
- Coronary angiography

All patients were admitted to coronary care unit or cardiac ward with monitored beds. Patients with no troponin leak were sent for coronary CT angiogram as they were considered a low risk group of patients. Patients with the diagnosis of STEMI had primary percutaneous coronary intervention and those with NSTEMI and troponin leaks had early coronary angiogram with subsequent revascularization if deemed appropriate. Timing, vascular access and choice of devices used were determined by the operator.

## Statistical analysis

All variables were entered into the Statistical Package for Social Sciences software, version 21 (SPSS Inc.) for data analysis. Descriptive statistics were computed and presented as means and standard deviations. Categorical variables reported in percentages for the gender, hypertension, diabetes mellitus, Dyslipidemia, cardiogenic shock, left ventricular failure, multivessel diseases and mortality.

## Results

The total number of patients who were admitted with ACS during the study period was 1242 patients among them 56 patients (4.5%) were identified to have met the inclusion criteria of ACS in the young. The Median age was 38 years (SD±5.3). Men were 52 patients (92%) while there was only 4 women. The overwhelming risk factors were smoking (78%) overweight (33%) and obesity (44%). Eight patients (14%) were taking aspirin prior to admission four (8.9 %) of them had prior PCI (Table 1). STEMI was the presenting clinical profile in 57% (32 patients) while NSTEMI was at 30% and unstable angina seen in 12% of the cases (Table 2). Coronary angiography was not performed in 9 patients due to either normal coronary CT angiogram in 6 patients and lack of consent from the reminder. Angiographic data (Table 3) was available in 47 patients. 11 patients (23.4%) had normal coronaries, 22 patients (46.8%) had coronary artery lesions of more than (70 %) and 8 patients (17%) had occluded vessel. Single vessel disease was common and seen in 27 patients (67.5 %). The culprit vessel was the anterior descending artery in the majority of the cases at (47.5 %). Thirty patients required revascularization. Twenty seven patients (90%) had PCI with stenting. One patient had thrombectomy without stenting due to a small vessel. Two patients (6.6%) had bypass surgery. The rest of the patients were treated medically due to mild disease. There was no adverse events seen in this cohort wither in hospital or within 30 days this likely due to small number of patients. **Table 1** Demographics

Total number 56	Number	percentage
Mean age	38 (SD ± 5.3)	
Male	52	92.8
Female	4	7.1
Non-smokers	12	21.4
Smokers	44	78.5
Dyslipidaemia	16	28.5
Heart failure	5	8.9
Prior PCI	5	8.9
Prior use of aspirin	8	14.2
BMI	N =10	17.8
	Overweight =25	44.6
	Obese =19	33.9
	Morbid obesity =2	3.5
Mean hospital stay	4 (SD ±2 ) days	

**Table 2** Mode of presentation

Total number 56	Number	percentage
Unstable angina	7	12.50%
NSTEMI	17	30.30%
STEMI	32	57.10%

**Table 3** Angiographic data

Total number 47	Number	Percentage
Normal coronaries	11	23.40%
Mild CAD	5	10.60%
Moderate CAD	1	2%
Severe CAD	22	46.80%
Occluded vessel	8	17%
<b>Infarct related vessel (40)</b>		
LAD	19	47.50%
LCX	8	20%
RCA	8	20%
L MAIN	2	5%
DIAGONAL	1	2.50%
PLV	1	2.50%
PDA	1	2.50%
<b>Disease extent (40)</b>		
Single vessel disease	27	67.50%
Two vessel disease	9	22.50%
Three vessel disease	4	10%
<b>INTERVENTIONS</b>		
PCI	27	90%
Thrombus aspiration alone	1	3.30%
CABG	2	6.60%

## Discussion

There are many definitions of acute coronary syndrome among the young. The most accepted cut-off point of age is 45 years or younger.<sup>12-14</sup> Many studies have reported a prevalence of 5–7.6%.<sup>15-19</sup> in Saudi population it was reported by Mushabab et al.,<sup>20</sup> to be (11.6%) our study although ten years later showed less prevalence of 4.5%. It was not surprising to find out that the majority of patients were men. Many were smokers (78 %) this is similar to what was previously reported by GRACE study was there was a strong association between cigarette smoking and ST-elevation MI in young patients with ACS.<sup>21</sup> Cigarette smoking is a recognized cause for endothelial dysfunction it can also induce vasoconstriction and promotes atherosclerosis and subsequently creates a thrombotic milieu.<sup>22</sup> Balgaith et al.,<sup>22</sup> have also reported a 60% prevalence of smoking among young Saudis with ACS.<sup>23</sup> Despite a previously reported high prevalence of diabetes (46.7%) among similar local groups<sup>20-23</sup> there were no diabetic patients among our cohorts. Another observation was a high prevalence of overweight and obesity comparable to previous local reports.<sup>23</sup> This is likely due to bad dietary habits and lack of exercise.

STEMI prevalence in this age group was previously reported to be 38%.<sup>20</sup> Our study found a higher presentation of STEMI among young patients 57%. STEMI carries significant morbidity, psychological and financial constraints for the patient and his family.<sup>24</sup> We noted absence of in-hospital or 30-day mortality and or adverse events this observation was reflected by many previously reported studies that showed favourable outcomes in young patients presenting with ACS.<sup>18,19,25,26</sup> Our study adds to the accumulating local data of acute coronary syndrome in the young. Clearly showing association between smoking and overweight although diabetes is prevalent in our society yet this was not reflected in this cohort. Prevention measures to promote smoking cessations and provide a culture that advocates life style changes through adoption of healthy dietary habits and exercise programs is warranted as these are modifiable risk factors.

## Conclusion

Majority of acute coronary syndrome among young Saudi patients present with STEMI, Yet those patient have favourable short term outcomes, the predominant risk factors are smoking and obesity which through life style changes can lessen cardiovascular disease burden.

## Limitations

Our study has many limitations, it's a retrospective therefore has an inherent selection bias due to its observational nature and single center which may affect generalizability. Another limitation is its small number of patients and lack of control group. Yet the data provided is similar to previously reported local studies.

## Acknowledgment

We would like to thank all the staff of King Faisal Cardiac Center catheterization laboratory and the department of medical records at the King Abdulaziz Medical city in Jeddah.

## Conflicts of interest

None of the authors have any declared conflicts of interest.

## Ethical approval

The study was approved by the king Abdullah international research center (KAIMRC) study number RJ19/041/J.

## References

1. M Eged, G Viswanathan, G K Davis. Myocardial infarction in young adults. *Postgrad Med J.* 2005;81(962):741–745.
2. Weinberger I, Rotenberg Z, Fuchs J, et al. Myocardial infarction in young adults under 30 years: risk factors and clinical course. *Clin Cardiol.* 1987;10(1):9–15.
3. Chouhan L, Hajar HA, Pompisiello JC. Comparison of throm-bolytic therapy for acutemyocardial infarction in patients aged <35 and >55 years. *Am J Cardiol.* 1993;71(2):157–159.
4. Perski A, Olsson G, Landou C, et al. Minimum heart rate and coronary atherosclerosis: independent relations to global severity and rate of progression of angiographic lesions in men with myocardial infarction at a young age. *Am Heart J.* 1992;123(3):609–616.
5. Jalowiec D, Hill J. Myocardial infarction in the young and in women. *Cardiovasc Clin.* 1989;20(1):197–206.
6. Friedman G, Cutter G, Donahue R, Hughes G, et al. CARDIA: study design, recruitment, and some characteristics of the examined subjects. *J Clin Epidemiol.* 1988;41(11):1105–1116.
7. Tuzcu E, Kapadia S, Tutar E, et al. High prevalence of coronary atherosclerosis in asymptomatic teenagers and young adults: evidence from intravascular ultrasound. *Circulation.* 2001;103(22):2705–2710.
8. Al-Nozha MM1, Arafah MR, Al-Mazrou YY, et al. Coronary artery disease in Saudi Arabia. *Saudi Med J.* 2004;25(9):1165–1171.
9. Elhadd T, Al-Amoudi A, Alzahrani A. Epidemiology, clinical and complications profile of diabetes in Saudi Arabia: a review. *Ann Saudi Med.* 2007;27(4):241–250.
10. Population of Saudi Arabia. 2017.
11. Ezra A Amsterdam, Nanette K Wenger, Ralph G Brindis, et al. 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology.* 2014;64(24):e139–e228.
12. Hoit BD, Gilpin EA, Henning H, et al. Myocardial infarction in young patients: an analysis by age subsets. *Circulation.* 1986;74(4):712–721.
13. Malmberg K, Bavenholm P, Hamsten A. Clinical and biochemical factors associated with prognosis after myocardial infarction at a young age. *J Am Coll Cardiol.* 1994;24(3):592–599.
14. Oliveira A, Barros H, Azevedo A, et al. Impact of risk factors for non-fatal acute myocardial infarction. *Eur J Epidemiol.* 2009;24(8):425–432.
15. Brscic E, Bergerone S, Gagnor A, et al. Acute myocardial infarction in young adults. *Am Heart J.* 2000;139(6):979–984.
16. Imazio M, Bobbio M, Bergerone S, et al. Clinical and epidemiological characteristics of juvenile myocardial infarction in Italy: the GISSI experience. *G Ital Cardiol.* 1998;28(5):505–512.
17. Tungsutra W, Tresukosol D, Buddhari W, et al. Acute coronary syndrome in young adults: the Thai ACS registry. *J Med Assoc Thai.* 2007;90(Suppl1):81–90.
18. Morillo P, Bertomeu V, Pabón P, et al. PRIAMHO II Investigators. Characteristics and outcome of acute myocardial infarction in young patients. The PRIAMHO II study. *Cardiology.* 2007;107(4):217–225.
19. Panduranga P, Sulaiman K, Al-Zakwani I, et al. Acute coronary syndrome in young adults from Oman: results from the Gulf registry of acute coronary events. *Heart Views.* 2010;11(3):93–98.
20. Mushabab A Al-Murray, Adel A Al-Masswary, Mohamed D Dardir, et al. Clinical presentation and short-term outcome of acute coronary syndrome in native young Saudi population. *J Saudi Heart Assoc.* 2012;24(3):169–175.
21. Blankstein R, Budoff MJ, Shaw LJ, et al. Predictors of Coronary Heart Disease Events Among Asymptomatic Persons With Low Low-Density Lipoprotein Cholesterol MESA (Multi-Ethnic Study of Atherosclerosis). *J Am Coll Cardiol.* 2011;58(4):364–374.
22. Sinha SK, Krishna V, Thakur R, et al. Acute myocardial infarction in very young adults: A clinical presentation, risk factors, hospital outcome index, and their angiographic characteristics in North India - AMIYA Study. *ARYA Atheroscler.* 2017;13(2):79–87.

23. Balghith M. Risk Factors among Young Saudi Male Patients who underwent Coronary Revascularization (PCI or CABG). *J Cardiol Curr Res*. 2017;9(3):00324.
24. Sinha R, Fisch G, Teague B. Prevalence of impaired glucose tolerance among children and adolescents with marked obesity. *N Engl J Med*. 2002;346(11):802–810.
25. Moccetti T, Malacrida R, Pasotti E, et al. Young patients with acute myocardial infarction. *Arch Intern Med*. 1972;197(157):865–869.
26. Chen YL, Bhasin A, Youssef AA, et al. Prognostic factors and outcomes in young Chinese patients with acute myocardial infarction undergoing primary coronary angioplasty. *Int Heart J*. 2009;50(1):1–11.