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## Cardiovascular risk factors profile in patients with acute coronary syndrome with particular reference to left ventricular ejection fraction

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### ABSTRACT

**Background:** Acute coronary syndrome (ACS) remains a leading cause of death in the United States. Numerous studies have shown that the degree of LV systolic dysfunction is a major if not the most important determinant of long-term outcome in ACS.

**Objectives:** To identify the most important risk factors and other clinical predictors which might have impact on left ventricular ejection fraction in patients with ACS.

**Results:** The total patients (299) admitted to our center from July, 2015 till December, 2015; with established diagnosis of ACS were classified in to two groups: Group I: 193 patients with impaired LVEF < 40% (64.5%), Group II: 106 patients with LVEF equal or >40% (35.5%). The patients of group I were significant elderly compared to those of group II (60.9 ± 11.2 vs 56.9 ± 10.6; p = 0.002), had significant history of DM and CKD (66.3% and 31.1% VS 49.1% and 19.8%; p = 0.004 and 0.036 respectively), presented mainly with STEMI- ACS (51.3% VS 28.3% respectively; p < 0.001) with +v cardiac biomarker (troponin) (90.2% VS 66.0%; p < 0.001). Moreover, patients of group I had more significant ischemic MR compared to the patients of group II (24.9% VS 3.8% respectively; p < 0.001) with higher rate of LV thrombus discovered by echocardiography (25.4% VS 1.9%; p < 0.001). Extensive significant CAD disease was observed to be higher among patients of group I (69.4% VS 57.5%; p = 0.039) and those patients treated mainly with PCI revascularization therapy (68.9% VS 52.8%; p = 0.002) compared to patients of group II who mainly treated medically (34.9% VS 17.6 %; p < 0.001). Multiple logistic regression analysis demonstrated that DM (odds ratio (OR): 2.64, 95% confidence interval (CI): 1.45–4.79, P = 0.01), presence of significant ischemic MR (OR: 13.7, 95% CI: 2.84–66.1, p = 0.001) and presence of significantly diseased coronary vessels (odds ratio (OR): 5.06, 95% confidence interval (CI): 1.14–22.6, P = 0.033), all were independent predictors for significant LV dysfunction (LVEF < 40%) which predict poor outcome in ACS patients.

**Conclusion:** We concluded that DM, presence of significant ischemic MR, and increased number, severity of diseased coronaries all were independent predictors of LV dysfunction (LVEF < 40%) which is known to predict poor outcome. Identification of those risk predictors upon patient evaluation could be helpful to identify high risk-patients, in need of particular care, aggressive therapy and close follow-up to improve their poor outcome.

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### 1. Introduction

Acute coronary syndrome (ACS) remains a leading cause of death in the United States .1 There is racial variation in its epidemiology and outcome.2–4 It describes the range of myocardial ischemic states that includes unstable angina (UA), non-ST

elevated myocardial infarction (NSTEMI), or ST-elevated myocardial infarction (STEMI). The diagnosis and classification of ACS is based on clinical features, electrocardiogram (ECG) findings and biochemical markers of myocardial necrosis.5

Numerous studies have shown that the degree of LV systolic dysfunction is a major if not the most important determinant of long-term outcome in ACS.6 Among patients with ACS, impaired LV systolic function(LVEF <40%) is associated with increased 1-year mortality or hospitalization for HF, regardless of the method or timing of the LVEF assessment.7

The World Health Organization has recognized obesity, diabetes mellitus(DM), hypertension(HTN), chronic kidney disease

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(CKD), hypercholesterolemia, and smoking among the top10 traditional risk factors for premature death and morbidity.<sup>8</sup> The ultimate importance of knowing those risk factors is to determine and identify the individual risk.

In this study, we aim to perform a brief overview of prevalence of relatively important risk factors and other clinical predictors which might have impact on left ventricular ejection fraction in patients with ACS admitted to our center.

## 2. Methods

It is a descriptive, prospective, single center, observational study of all consecutive acute coronary syndrome patients admitted to our center. A total 299 patients presented to our cardiac center from July, 2015 till December, 2015; with established diagnosis of ACS (by clinical symptoms, ECG changes and/or elevated cardiac biomarkers) and sent to our center for further evaluation and providing the suitable line of management. The study of the subjects was divided in to two groups: Those with LVEF <40% (Group I), and those with LVEF equal or >40% (Group II). Ejection fraction was determined by echocardiography, in which the volumes of the heart's chambers are measured during the cardiac cycle. Ejection fraction can then be obtained by dividing the volume ejected by the heart (stroke volume) by the volume of the filled heart (end-diastolic volume).<sup>9</sup>

We analyzed the baseline demographic and clinical characteristics (age, gender, BMI, presence of DM, HTN, dyslipidemia, smoking and CKD), clinical presentation (STEMI, NSTEMI, and UA), and cardiac biomarker (Troponin). Echocardiographic findings (LVEF, presence and severity of MR and LV thrombus evidence) were all recorded. The number of significantly diseased vessel (>50% stenosis in left main or >70% in LAD, LCX and RCA) were identified with coronary angiography were also assessed. We defined patients with severe coronary artery disease as those who had left main disease and/or had two, three significantly stenosed coronaries. However, line of treatment selected to each patient (medical treatment, PCI and CABG) was also assessed.

Our study is designed to be the part of the standard of patient care, to measure and improve quality of ACS management, and has received approval of the ethics committee/institutional review board of the King Abdullah Medical City.

### 2.1. Statistical analysis

The collected data were tabulated and analyzed using SPSS version 16 soft ware (Spss Inc, Chicago, ILL Company) and Microstat W software (India, CNET Download.com). Categorical

data were presented as number and percentages while quantitative data were expressed as mean  $\pm$  standard deviation. Chi square test ( $X^2$ ), "Z" test were used to analyze categorical variables. Quantitative data were tested for normality using Kolmogorov Smirnov test, assuming normality at  $P > 0.05$ , using Student "t" for normally distributed variable. Binary logistic regression analysis was used to detect the significant predictors of significant LV dysfunction

(LVEF < 40%). The accepted level of significance in this work was stated at 0.05 ( $P < 0.05$  was considered significant).

$P > 0.05$  is non significant (NS)

$P < 0.05$  is significant (S)

$P \leq 0.001$  is highly significant (HS)

## 3. Results

The total patients (299) admitted to our center from July, 2015 till December, 2015; with established diagnosis of ACS were classified in to two groups: Group I: 193 patients with impaired LVEF <40% (64.5%), Group II: 106 patients with LVEF equal or >40% (35.5%). We categorized our data into three main categories: baseline characteristics, clinical measures and line of treatment selected to each patient.

### 3.1. Baseline characteristics

The patients of group I were older compared to those of group II ( $60.9 \pm 11.2$  vs  $56.9 \pm 10.6$ ;  $p = 0.002$ ). Compared to group II, patients of group I had significant history of DM and CKD (66.3% and 31.1% vs 49.1% and 19.8%;  $p = 0.004$  and  $0.036$  respectively). There were no observed significant differences between group I and group II patients regarding the gender, BMI, rates of HTN, hyperlipidemia and smoking ( $p$  value = 0.78, 0.48, 0.65, 0.15 and 0.071 respectively) (Table 1).

### 3.2. Clinical measures

With regard to the type of ACS presentation, group II patients presented mainly with UA (33% vs 11.4%;  $p < 0.001$ ) while group I patients presented mainly with STEMI (51.3% vs 28.3% respectively;  $p < 0.001$ ). Moreover, patients of group I mostly had +ve cardiac biomarker (troponin) (90.2% vs 66.0%;  $p < 0.001$ ). Also, there was observed increase in the severity of MR among group I patients as incidence of patients who had moderate and severe MR in this group were (24.9% vs 3.8% respectively;  $p < 0.001$ ). Interestingly, the rate of LV thrombus discovered by echocardiography was higher among high risk group patients (group I) (25.4% vs 1.9%;  $p < 0.001$ ) (Table 2).

**Table 1**

Comparison between the two groups according to demographic data.

Variable	Group I (LVEF < 40%) (N = 193)	Group II (LVEF > 40%) (N = 106)	Test	P- value
AGE (mean $\pm$ SD)	60.9 $\pm$ 11.2	56.9 $\pm$ 10.6	St. "t" = 3.05	0.002 (S)
Gender (no, %)	Male	141 (73.1)	$X^2 = 0.08$	0.78 (NS)
	Female	52 (26.9)		
BMI (no, %)	25–30	83 (62.4)	0.49	0.48 (NS)
	Obese > 30	50 (37.6)		
DM (no, %)	128 (66.3)	52 (49.1)	8.51	0.004 (S)
HTN (no, %)	128 (66.3)	73 (68.9)	0.2	0.65 (NS)
Hyperlipidemia (no, %)	80 (41.5)	53 (50)	2.03	0.15 (NS)
Smoking (no, %)	19 (9.8)	18 (17)	3.2	0.071 (NS)
CKD (no, %)	60 (31.1)	21 (19.8)	4.4	0.036 (S)

BMI: body mass index; CKD: chronic kidney disease, DM; diabetes mellitus; HTN: hypertension.

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