Thamar University Journal of Natural & Applied Sciences ISSN: 2073-0764
2016 A(**6**) 21-33

TUJNAS

Coronary risk factors in Acute Coronary Syndrome Patients in Yemen

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ABSTRACT

Background: A comparative retrospective study has made to compare the distribution of risk factors and complications in acute coronary syndrome (ACS) patients and other cardiac patients.
Methods: Records of 768 patients from Sana'a city and other cardiac patients in Yemen. To assess the risk factors for acute coronary syndrome (ACS); age, hypertension, diabetes mellitus, hyperlipidemia, cigarette smoking and reported history and family history of coronary artery disease (CAD). To assess the complications such as heart failure, arrhythmias and cerebro-vascular accident (CVA).
Results: The mean age of acute coronary syndrome patients was significantly lower than other cardiac disease patients 56.8 year vs. 55.3 years; p= 0.007. History of hyperlipidemia was significantly higher acute coronary syndrome patients than other cardiac patients 49.2% vs. 38.3%; p=0.002. Reported history of coronary artery disease was also significantly higher among ACS patients. Hypertension, history of diabetes mellitus, cigarette smoking and reported family history of coronary artery disease were comparable among acute coronary syndrome patients and other cardiac patients. In-hospital complications: Cerebro-vascular accident was significantly higher among ACS patients than other cardiac patients 7.8 % vs. 4.4 %; p= 0.0001. Heart failure and arrhythmias rates were comparable. Wall motion abnormalities were comparable 79.2 vs. 73.2; p=0.51. While Ejection Fraction was lower in ACS patients than other cardiac patients 49.8.8% vs. 54.8; p=0.0001.
Conclusions: The mean age was higher among acute coronary syndrome patients. History of hyperlipidemia and history of coronary artery disease were higher among acute coronary syndrome patients. Cerebro-vascular accident rate was higher in acute coronary syndrome patients.
Keywords: Acute coronary syndrome, risk factors, Yemen.

INTRODUCTION

Acute Coronary Syndrome (ACS) is defined as a wide spectrum of conditions, ranging from silent ischemia and exertion-induced angina, through unstable angina, to **acute** myocardial infarction. Unstable angina occupies the centre of this spectrum, causing disability and risk greater than that of chronic stable angina but less than that of **acute** myocardial infarction (AMI). Coronary Artery Disease (CAD) is characterized by atherosclerosis in the coronary arteries. Coronary artery disease is a well-established major cause of death and disability in developed countries as well as in developing countries (1). Coronary artery disease (CAD) continues to be a leading cause of morbidity and mortality among adults in Europe and North America (2). Twelve million individuals in the USA and 143 million worldwide have coronary artery disease (3). Although cardiovascular mortality has been diminishing in all of Western Europe and North America for the past decades, it is still one of the major contributors to mortality, especially premature death (*4*).

Despite a recent decline in developed countries, both CAD mortality and the prevalence of CAD risk factors continue to rise rapidly in developing countries (5, *6*). Traditional risk factors for CAD are age, male sex, family history, diabetes mellitus (DM), dyslipidaemia, hypertension, obesity, and cigarette smoking. These risk factors are useful for assessment of each individual's cardiovascular risk (*7*). Many other risk factors for, however, have not fulfilled these criteria or are still under scientific scrutiny (8, 9). Several studies have shown classical risk factors partially explain the prevalence of CAD (10, 11 and 12). Differences geographical in and genetic factors lead to differences in the incidence of CAD worldwide (13, 14).

Geographical variations in CAD prevalence and risk factors have been reported both between and within countries (15). Evidence for this is so far conflicting. Many studies have examined risk factor profile for CAD among population. Results showed that there are differences in the prevalence of CAD and its risk factors at different geographical regions.

Objectives

(1) To estimate the prevalence of risk factors in acute coronary syndrome (ACS) patients versus other cardiac patients.
(2) To investigate the clinical presentation and complications among acute coronary syndrome and other cardiac patients.

METHODOLOGY

Study design: A comparative retrospective study design was employed for this study.

Population samples

This study was done for diagnosed adult acute coronary syndrome Yemeni patients aged 30-69 years.

Study Area

Sana'a city, Republic of Yemen.

Case Selection

We selected the acute coronary syndrome Yemeni Patients admitted to cardiac centre, Al-Thawrah Modern hospital, Sana'a, Yemen. Records of consecutive patients were received respectively.

Inclusion Criteria

Age 30 – 69 years and diagnosed as acute coronary syndrome (clinical symptoms and / or ECG and /or significant cardiac enzyme elevation).

Exclusion Criteria

Including Congenital heart disease, rheumatic heart disease and, chronic obstructive pulmonary disease, chronic medical illness (e.g. end stage liver /renal failure), and malignancies.

Sample Size

A total of 768 acute coronary syndrome and other cardiac disease admitted in cardiac centre, Al-Thawrah Modern hospital, Sana'a were studied. Some384 patients were from acute coronary syndrome (ACS) patients and equal number with other cardiac dieses.

Study Protocol

The following data were collected:

1. Clinical presentation: - Typical chest pain, atypical chest pain and shortness of breath

2. Type of ACS: -AMI including Q wave MI, Non Q wave MI and unstable angina.

3. Clinical examination: - Clinical examination findings especially blood pressure (BP), heart rate (HR) and cardio vascular system.

Reported history of coronary artery disease risk factors including hypertension, diabetes mellitus, smoking cigarette, lipid profile disturbance and history of CAD were collected.

4. Laboratory investigations and procedures: -

4.1. Laboratory investigations: -Definitions: -

Diabetes mellitus

The fasting blood glucose (FBG) was interpreted using WHO criteria: (<7 mmol l-1(<120 mg/ dl): negative for diabetes mellitus and >7 mmol l-1: (>120): positive for diabetes mellitus.

Hypercholesterolemia

Defined as mild cholesterol values between 5.2 – 6.2 mmol/l. Moderate-sever cholesterol values >6.2 mmol/l and consider a major risk factor for CAD while HDL greater than 1.6 mmol/l was consider a negative risk factor for CAD. Total cholesterol/HDL ratio values between 5 was normal and 6.5 characterized the individual at intermediate risk for CAD and more than 6,5 wile values ratio more than 6.5 characterized individuals at high risk of developing CAD (36). Laboratory investigations needed were CBC, total cholesterol, HDL-C, LDL-C, Triglycerides, FBG, RBG, CK and CK-MB.

4.2. ECG: - ECG reports at the day of admission and at the discharge day. ST elevation with or without Q wave, Q wave, T wave changes, R wave changes and arrhythmias

4.3. Echocardiography: -Measurement of intact are LV function (EF), any segmental wall motion abnormalities (hypokinesia, akinesia, or dyskinesia) and detection of any complications of ACS such as thrombus, aneurysmal formation, and valvular abnormalities.

Statistical Analysis: -Data were entered in a personal computer, processed by SPSS program to calculate percentages, mean ± standard deviation. The (two-tailed) test was used to assess the difference between continuous variables. Chi Squared (χ^2) tests will be used to compare categorical variables. The Odds ratio was calculated. We set the level of the statistical significance at a P value of < 0.05. Statistical tests with P < 0.10 and > 0.05 will be considered to be of borderline significance.

RESULTS

Data from seven hundred sixty eight consecutive patients were analyzed.

1-Age and Clinical diagnosis:

The mean age of ACS patients was significantly higher than other cardiac diseases 56.8 year vs. 55.3 years, *P*= 0.007 (Table 1).

Acute myocardial infarction (AMI) at ACS patients was higher 76.8 % vs. 72.1 % as well as unstable angina 27.9 % vs. 25.5% respectively (Table 2).

Table 1: Patient's characteristic age, blood pressure and heart rate among ACS patients and other cardiac patients (No=768).

Patients		***№***	***Mean***	***Std. Deviation***	***T***	***p***
Age year	ACS	384	55.3	8.24	2.72	0.007
	Other	384	56.8	7.14	2.50	
Systolic BP mmHg	ACS	384	135	24.95	2.50	0.013
	Other	384	130	23.23		
Diastolic BP mmHg	ACS	384	84	16.71	2.62	0.009
	Other	384	81	17.71		
Heart Rate Beat/min	ACS	384	89	17.55	4.73	< 0.0001
	Other	384	83	16.89		

Table 2: Shows the diagnosis of ACS Yemeni patients and other cardiac disease (No=768).

Altitude	***Diagnosis***				***Total***	
	Acute MI		Unstable Angina		**№**	**%**
	№	percent	№	percent		
ACS patients	295	76.8 %	89	27.9 %	384	100 %
Other Cardiac patients	277	72.1 %	107	23.2 %	384	100 %

Chi- sq 2.2, P value 0.136

2. Clinical presentation:

Heart rate of ACS patients was significantly other cardiac patients 89.13% vs. 83.25%; *P*=0.000 (Table 1).

Measurement of blood pressure; Systolic blood pressure among ACS patients was significantly higher than other cardiac patients 130mmHg vs. 135mmHg (P=0.013). Diastolic blood pressure was also significantly higher among ACS patients 84 mmHg vs. 81mmHg; P= 0.009 (Table 1).

3. Prevalence of history of coronary artery disease risk factors:

The prevalence of history of hyperlipidemia was significantly higher in ACS patients than other cardiac patients 49.2% vs. 38.3%; p =0.002 (table 3). Prevalence of reported history of CAD was significantly higher among ACS patients 16.7% vs. 9.4%; p=0.003 (Table 3).

The prevalence of history of hypertension among ACS Yemeni patients was higher than other cardiac patients 49.2% vs. 45.1%; p=0.49 (table 3).

Prevalence of history of DM was also higher among ACS patients 30.7% vs. 25.3%; p=0.091 (Table 3).

Prevalence of smoking among ACS patients was also higher than other cardiac patients 64.1% vs. 57.8%; p =0.076 (Table 3).

Reported family history of CAD among ACS patients was non significantly higher 17.2% vs. 15.4%, p =0.49 (Table 3).

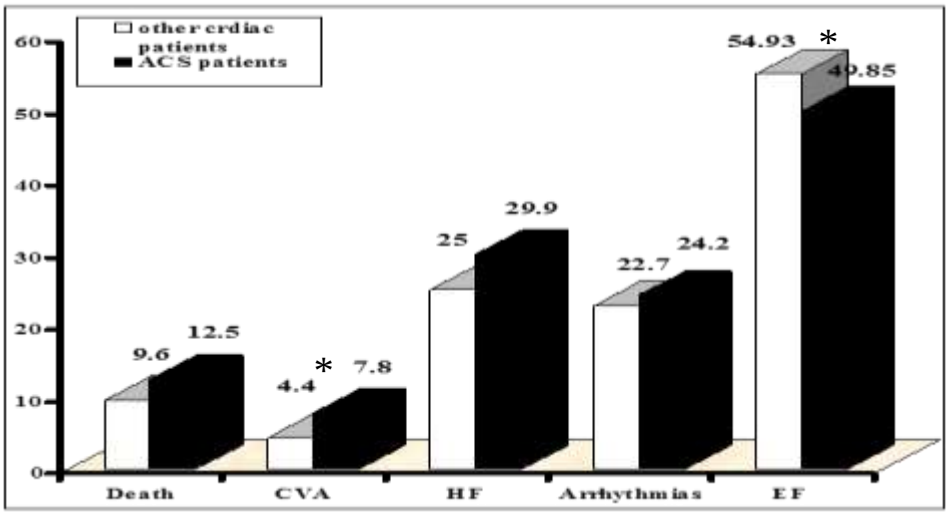
Table 3: Prevalence of risk factors for ACS.

Altitude	History of HT	History of DM	History of smoking	History of CAD	Family History of CAD	History of hyperlipedaemia
ACS patients	49.2 %	30.7%	64.1%	16.7%	17.2%	49.2%
Other cardiac patients	45.1%	25.3%	57.8%	9.4%	15.4%	38.3%
Chi-squire	133	2.8	3.15	9.01	0.46	9.3
P	0.247	0.091	0.076	0.003	0.494	0.002

4. In-hospital complications of ACS Yemeni patients and other cardiac patients:

In-hospital complication: Cerebro-vascular accidents (CVA) was significantly higher among ACS patients 7.8 % vs. 4.4 %; P= 0.0001. Heart failure and arrhythmias were slightlyhigher among ACS patients than other cardiac patients (Figure 1),

Wall motion abnormalities detected by echocardiography was higher among ACS patients 79.2 vs. 73.2; P=0.51 (table 4). While EF was lower among ACS patients 49.8.8% vs. 54.8 P=0.0001 (Figure 1).



* Significant difference (Chi-sq = 3.830 *P*= 0.050)

Figure 1: Shows in-hospital complications among ACS Yemeni patients and other cardiac patients (N=867).

Table 4: Wall motion abnormalities detected by echocardiography in ACS Yemeni patients and other cardiac patients (N=768)

Altitude	***IHD***				***Total***	
	Yes		No		***№***	***%***
	№	percent	**№**	percent		
ACS patients	304	79.2 %	80	20.8 %	384	100 %
Other cardiac patients	281	73.2 %	103	26.8%	384	100 %

Chi-sq 3.79 P value 0.51

5. Laboratory findings:

Biochemical findings

Creatinine Kinase (CK) among ACS patients was significantly higher than other cardiac patients as well as CK-MB (table 5). Total Cholesterol in ACS patients was significantly higher in ACS patients than other cardiac patients. LDL-C was high in ACS patients 136.3mg/dl vs. 128.5mg/dl, while HDL-C was higher in other cardiac patients 44.2mg/dl vs. 40.1mg/dl (table 5). Triglycerides (TG) were higher in ACS patients than in other cardiac patients 205.8mg/dl 184.04mg/dl P=<0.0001 (table 6). Fasting and random blood sugar were significantly higher among ACS patients than in other cardiac patients, P=0.000 (Table 5).

Table 5: Biochemical findings finding among ACS patients

Patients		***N***	***Mean***	***Std. Deviation***	***T***	***P***
LDL-C	ACS	384	136.36	33.265	3.363	0.001
	Other	384	128.53	31.251		
HDL-C	ACS	384	40.10	9.467	5.852	0.000
	Other	384	44.20	9.950		
TG	ACS	384	205.82	71.160	4.988	0.000
	Other	384	184.04	47.481		
FBG	ACS	384	116.04	48.63	3.77	0.000
	Other	384	103.99	39.320		
RBG	ACS	384	161.3	80.18	2.84	0.005
	Other	384	146.2	65.9		

DISCUSSION

Our study was performed on 768 ACS Yemeni patients. There age range was 30 - 69 years with a mean age 56.1 ± 7.7 years.

Our results reveal that the mean age of ACS Yemeni patients was lower than all previous reports in developed countries such as in ACS European patients 65 years (37).

The mean age was similar to those of ACS Saudi patients which was 57 years (38). The mean age of other cardiac diseases patients was significantly higher 56.8 year vs. 55.3 years; P= 0.007. Our ACS Yemeni patients' age is comparable with the mean age of life expectancy at birth 59.8 (39).

Past history of DM among ACS Yemeni patients was slightly higher than other cardiac patients. Blood glucose levels (fasting and random blood glucose) were significantly higher among ACS patients; P<0.0001. The prevalence of history of DM among ACS patients is 28%. This prevalence is higher than the prevalence of DM in general adult Yemeni population which is 9.75 % (40). However our diabetic prevalence is higher than those reported by the major European survey among European ACS patients which was 23% (37). Diabetes increases the risks of cerebrovascular disease, peripheral vascular disease, and congestive heart failure (41). Diabetes and its associated metabolic abnormalities favor an imbalance in the coagulation/fibrinolytic systems that support clot formation and stability (42). These various abnormalities may contribute to heightened susceptibility to the thrombotic complications of atherosclerosis.

The prevalence of hyperlipidaemia among ACS Yemeni patients was significantly higher than other cardiac patients. Total cholesterol and LDL-C in ACS Yemeni patients were significantly higher. Our result agrees with some other studies (22, 33, and 35). Epidemiological studies showed that elevated concentrations of serum total cholesterol and LDL-cholesterol are independent risk factors for CVD (43). There is much evidence to suggest that the process of atheroma is triggered by hyperlipidaemia, with deposition of lipids in the arterial wall. Various scientific organizations, including the American Heart

Association, National Heart, Lung, and Blood Institute have recommended reductions in dietary total fat and saturated fat intake to treat or prevent CAD (44).

The prevalence of hypertension in general adult Yemeni population is 17.1 % (40). The prevalence of past history of hypertension among ACS Yemeni patients is comparable with other cardiac diseases patients 47.1. Measurement of systolic and diastolic blood pressure was significantly higher among ACS patients. The prevalence of hypertension among ACS patients in Europe was 48% (37). While the prevalence of hypertension among ACS Saudi patients was 46.9% (21). Hypertension is a strong independent risk factor for the development of cardiovascular disease. In primary prevention, the relationship between blood pressure and cardiovascular risk appears to be positive (45).

Heart rate of ACS Yemeni patients was significantly higher

The prevalence of smoking among ACS Yemeni patients was comparable 64.1% vs. 57.8 %. Our rate of smoking was comparable to the other developing countries. Prevalence of smoking among ACS Yemeni patients was76.9% (1), while the prevalence of smoking among ACS European ACS patients was lower 48 %(37).

Smoking affects atherothrombosis by several mechanisms. In addition to accelerating atherosclerotic progression (46). Long-term smoking may enhance oxidation of LDL-C and reduce levels of HDL-C (47). Smoking also impairs endothelium-dependent coronary artery vasodilatation; has multiple adverse hemostatic effects (48).

Reported family history and history of CAD at high altitude were higher than at low altitude ACS patients. A family history of CAD is an independent risk factor for MI, and that the number of relatives and the age at which they were affected is related to the strength of the association. There is a multiplicative effect on relative risk factors between family histories (49).

Hemoglobin was significantly higher among ACS patients. The increase in hemoglobin leads to increased atherosclerotic process. Leukocytes were significantly higher among high altitude patients. In men and women of all ages with the spectrum of ACS, initial leukocyte count is an independent predictor of hospital death and the development of heart failure (50).

The prevalence of ACS complications during hospitalization; Cerebro-vascular accident was significantly more common among ACS patties, while death, HF, and arrhythmias were comparable between ACS patients and non ACS patients.

The presence of wall motion abnormalities detected by echocardiography (hypokinesia, akinesia, and dyskinesia) was significantly higher at ACS patients than non ACS patients.

Ejection fraction (EF) was significantly lower among ACS patients. The Ejection fraction increases when the necrosis parts of the heart are less. So we hypothesize that ACS patients have more necrosis in heart muscle than non ACS patients.

CONCLUSION

The mean age was higher among other cardiac patients than ACS patients in Yemen. History of hyperlipidemia and history of CAD were higher among ACS patients than other cardiac patients. In-hospital complications; A Cerebro-vascular accident (CVA) rate was higher among ACS patients, while heart failure (HF) and arrhythmias were comparable between ACS and other cardiac patients. Ejection fraction was lower among ACS patients than other cardiac patients in Yemen.

ABBREVIATIONS

ACS; acute coronary syndromes, BP; blood pressure, CAD; coronary artery disease, CK; creatine kinase, CK-MB; creatine kinase –MB iso-inzyme, DM; diabetes mellitus, ECG; electrocardiography, EF; ejection fraction, FBG; fasting blood glucose, HA; high altitude, Hb; hemoglobin, HDL; high-density lipoprotein, HF; heart failure, HT; hypertension, IHD; ischemic heart disease, LA; low altitude, LDL; low-density lipoprotein, MI; myocardial infarction, NonQMI; none Q wave myocardial infarction, QMI; Q wave myocardial infarction, RBG; random blood glucose, T.G; triglycerides.

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عوامل الخطورة لمرضى متلازمة الشريان التاجي الحادة في اليمن

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ملخص

خلفية: لقد أجريت الدراسة (استعادية المقارنة) لمقارنة توزيع عوامل الخطر والمضاعفات لدى مرضى متلازمة الشريان التاجي الحادة في اليمن.

الطرق: تمت دراسة سجلات 768 مريضا من مدينة صنعاء ومقارنتهم بأشخاص ليس لديهم المرض. لتقييم عوامل الخطر لمتلازمة الشريان التاجي الحادة؛ العمر، وارتفاع ضغط الدم وداء السكري، وفرط الكولسترول والدهون بالدم، وتدخين السجائر وذكرت التاريخ والعائلة تاريخ من أمراض الشريان التاجي. وكذلك لتقييم المضاعفات للمرض مثل فشل القلب، وعدم انتظام ضربات القلب، والإصابات الأوعية الدموية الدماغية.

النتائج: كان متوسط عمر المرضى متلازمة الشريان التاجي الحادة أقل منه لدى غير المرضى 55.3 سنة مقابل 56.8 سنة (ع = 0.007). كان الكولسترول والدهون أعلى بكثير لدى مرضى متلازمة الشريان التاجي مقارنة بغير المرضى 49.2٪ مقابل 38.3٪ (ع = 0.002). كان الضغط الدموي أعلى لدى مرضى متلازمة الشرايين التاجية، وكذلك مرض السكري. تدخين السجائر كان أعلى قليلا لدى مرضى متلازمة الشرايين التاجية عنه لدى غير المرضى التاجي وضعها الطبيعي.

المضاعفات: كانت الإصابات الدماغية الوعائية أعلى بكثير بين مرضى متلازمة الشرايين التاجية الحادة منه لدى غير المرضى 7.8% مقابل 4.4% (ع=0.0001). كان قصور القلب وعدم انتظام ضربات القلب أعلى لدى مرضى الشرايين التاجية الحاد مقارنة بغير المرضى بالمتلازمة الحادة 79.2% مقابل 73.2% (ع=0.51). معدل الضخ القلبي كان أقل لدى متلازمة مرضى الشرايين التاجية الحاد 49.8% مقابل 54.8% لدى غير المرضى بالمتلازمة.

الاستنتاجات: كان متوسط العمر أقل بين المرضى الذين يعانون متلازمة الشريان التاجي الحادة. كان ارتفاع الدهون والكولسترول اعلي لدى مرضى الشرايين التاجية. القصة العائلية للإصابة بمتلازمة الشرايين التاجية كانت اعلي لدى مرضى المتلازمة مقارنة بغير المرضى. الإصابات الوعائية الدماغية واضطراب نظم القلب كانتا اعلي لدى مرضى الشرايين الحادة مقارنة بغير المرضى بمتلازمة الشرايين التاجية الحادة.

كلمات مفتاحية: متلازمة الشريان التاجي الحادة، عوامل الخطر، اليمن.