

Evaluation of risk factors in acute myocardial infarction patients admitted to the coronary care unit, Tripoli Medical Centre, Libya

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تقييم عوامل الاختطار لدى مرضى الاحتشاء الحاد في العضلة القلبية الذين قُبِلوا في وحدة الرعاية التاجية، طرابلس، ليبيا
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الخلاصة: تهدف هذه الدراسة إلى تقديم لمحة عامة عن عوامل الخطر لدى مرضى الاحتشاء الحاد في العضلة القلبية، ممن أدخلوا في مركز طرابلس الطبي في مدينة طرابلس في ليبيا، وقد استعرض الباحثون سجلات ست مئة واثنين وعشرين مريضاً، وكان وسطي أعمارهم 58.3 (±12.9) عاماً، ومن بين عوامل الاختطار التي أبلغوا عنها كان السكري 48.2٪، وارتفاع ضغط الدم 35.7٪، والتدخين 50.6٪، ومات مئة وعشرة مرضى منهم 17.7٪ (17.7٪) أثناء وجودهم في المستشفى، وكان 48.0٪ منهم يعانون بشكل رئيسي من الصدمة القلبية المنشأ. وكان معدل استخدام المعالجة بالأدوية الحالة للخطر منخفضاً لدى المريضات 40.4٪ مقابل 58.4٪ لدى المرضى؛ ولدى كبار السن ممن هم أكبر من خمسة وثمانين عاماً 31.6٪ مقابل 63.3٪ لدى من هم أقل من خمسة وخمسين عاماً، ولدى السكريين 45.3٪ مقابل 62.0٪ لدى غير السكريين؛ ولدى المصابين بارتفاع ضغط الدم 47.3٪ مقابل 57.8٪ لدى غير المصابين به. وحلّص الباحثون إلى ضرورة تنفيذ استراتيجيات الوقاية التي تستهدف تحسين الإنذار على المدى الطويل وإنقاص المعدلات الإجمالية للمراضة وللوفيات الناجمة عن أمراض القلب التاجية لدى المرضى في ليبيا.

ABSTRACT The aim of this study was to provide an overview of the risk factors for acute myocardial infarction in patients attending Tripoli Medical Centre, Libya. Records were reviewed for 622 patients with a mean age of 58.3 (SD 12.9) years. Diabetes mellitus (48.2%), hypertension (35.7%) and smoking (50.6%) were among the risk factors reported. There were 110 patients (17.7%) who died during hospitalization, mainly suffering cardiogenic shock (48.0%). The rate of use of thrombolytic therapy was low in patients who were female (40.4% versus 58.4% for males), older age (31.6% for those > 85 years versus 63.3% for patients < 55 years), diabetics (45.3% versus 62.0% for non-diabetic patients) and hypertensives (47.3% versus 57.8% for non-hypertensive patients). Prevention strategies should be implemented in order to improve the long-term prognosis and decrease overall morbidity and mortality from coronary artery disease in Libyan patients.

Évaluation des facteurs de risque chez des patients admis pour infarctus aigu du myocarde dans l'unité de soins aux coronariens du centre médical de Tripoli (Libye)

RÉSUMÉ L'objectif de la présente étude était de fournir une vue d'ensemble des facteurs de risque chez des patients séjournant au centre médical de Tripoli (Libye) pour un infarctus aigu du myocarde. Les dossiers de 622 patients âgés en moyenne de 58,3 ans (écart type 12,9) ont été étudiés. Le diabète sucré (48,2 %), l'hypertension (35,7 %) et le tabagisme (50,6 %) comptaient parmi les facteurs de risque signalés. Pendant leur séjour hospitalier, 110 patients sont décédés (17,7 %), principalement d'un choc cardiogénique (48,0 %). Le taux d'utilisation d'un traitement thrombolytique était faible chez les patients de sexe féminin (40,4 % contre 58,4 % pour les patients de sexe masculin), les personnes âgées (31,6 % pour les patients âgées de plus de 85 ans contre 63,3 % pour les patients de moins de 55 ans), les diabétiques (45,3 % contre 62,0 % pour les non diabétiques) et les hypertendus (47,3 % contre 57,8 % pour les patients ne souffrant pas d'hypertension). Des stratégies préventives doivent être mises en œuvre afin d'améliorer le pronostic à long terme des patients libyens et de réduire la morbidité et la mortalité globales dues à la coronaropathie.

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Introduction

Cardiovascular disease is a heterogeneous group of disorders that affect the heart and blood vessels. Coronary heart disease (CHD), in particular, is the main cause of premature death in many countries [1,2]. In Libya, as in many other African nations it is the number one cause of death [3]. In Africa, CHD accounted for 9.2% of deaths in 2001, principally due to hypertension, stroke, cardiomyopathy and rheumatic valve disease [4]. More recently, it has been concluded in one study in Benghazi that circulatory diseases were still the main cause of death in diabetics, with acute myocardial infarction (MI) at the top of the list [3].

The prevalence of acute MI as the first manifestation of ischaemic heart diseases is high in approximately 50% to 70% of patients and is a common cause for hospital admission [5]. Several factors related to the severity of the disease have been identified, such as smoking [6], diabetes mellitus [7], systemic arterial hypertension [8], dyslipidaemia [1], the number of arteries impaired and degree of functional impairment of the left ventricle [9]. Furthermore, age, sex, obesity, heavy alcohol consumption and physical inactivity were all also recognized as contributory factors [1]. The risk factors associated with CHD are multifactorial and work synergistically. Genetic predisposition, sex (it is more common in males), family history of ischaemic heart disease (especially in a first-degree relative under 55 years), stroke, peripheral vascular disease and advanced age are recognized risk factors for the development of CHD over which there is little control [10,11].

Many studies have been conducted on patients with acute MI, but little published information about acute MI in Libyan patients is available [3]. The present study was conducted with the goal of providing an insight into the demographic data, distribution of risk factors and clinical and laboratory

findings of patients with acute MI at Tripoli medical centre.

Methods

Setting and sample

Tripoli medical centre is a public hospital with 1485 beds of which 68 beds are assigned for critical care services. The hospital is the main teaching hospital for the college of medicine of Tripoli University. Although it is a tertiary referral hospital, it operates an active primary care centre with a 24-hour emergency coverage accessible to anyone and from which appropriate patients are admitted to the hospital's medical wards. The average bed occupancy rate is 70%.

The case records of all patients with the diagnosis of acute MI admitted to the coronary care unit in Tripoli medical centre between January 2006 and December 2008 were reviewed retrospectively. The following criteria were used for the diagnosis of acute MI: a clinical history of sudden chest pain, electrocardiogram (ECG) changes consistent with acute MI or characteristic changes in serum cardiac enzymes activity including: creatine kinase (CK), aspartate aminotransferase (AST), and lactate dehydrogenase (LDH) on 3 consecutive days after admission.

Data collection

For the purpose of the study, patient information related to age, sex, disease risk factors, clinical presentation, duration of symptoms prior to admission, and known history of diabetes, in addition to analysis of ECG and cardiac enzymes profile, was extracted from the patient's case notes. The main risk factors studied were: patient's sex, cigarette smoking (current and ex-smokers), medical history of diabetes or newly diagnosed hyperglycaemia occurring during hospitalization (fasting blood glucose ≥ 126 mg/dL or random blood glucose ≥ 200 mg/dL), hypertension ($\geq 140/90$ mmHg or on antihypertensive

medication), history of hyperlipidaemia (total cholesterol ≥ 200 mg/dL or being on lipid lowering drugs), history of CHD and history of cerebrovascular accident.

Statistical analysis

Data were analysed using *SSPS* statistical package, version 10. Frequency distributions were generated and the chi-squared test was used to assess the significance of differences between categories. *P*-valued < 0.05 were considered significant.

Results

There were 622 admissions to the coronary care unit during the study period. There were 471 patient records investigated for males (75.7%) and 151 for females (24.3%), giving a male to female ratio of 3.1:1. The mean age for male and female patients was 58.3 (SD 12.9) years (range 24–91 years) and 65.0 (SD 11.4) years (range 36–97 years) respectively. The ratio of patients ≥ 60 years of age to those < 60 was 1.0:1 in male and 3.3:1 in female patients. The peak age of occurrence of acute MI for males and females was 60–69 years (Table 1). The male to female ratio was 6.6:1 in those < 60 years of age and 2.1:1 in older patients.

Risk factors

Smoking, diabetes, hypertension and history of CHD were the most common cardiovascular risk factors in the sample studied. More than half (50.6%) of both male and female patients were reported to be current smokers (smoking history was only available for 457 patients) and out of the 296 patients 17.5% were ex-smokers and 62.6% were current smokers. Almost half of the pooled sample (48.2%) were identified as having diabetes mellitus (type 1 or 2 unspecified). History of hypertension and CHD were reported in 35.7% and 21.7% respectively. However, both dyslipidaemia and

Table 1 Age and sex distribution of myocardial infarction patients at Tripoli Medical Centre

Age (years)	Males (n = 417)		Females (n = 151)		Total (n = 622)	
	No.	%	No.	%	No.	%
< 50	146	31.0	17	11.3	163	26.2
50–59	84	17.8	18	11.9	102	16.4
60–69	138	29.3	53	35.1	191	30.7
70–79	81	17.2	47	31.1	128	20.6
> 79	22	4.7	16	10.6	38	6.1

history of cerebrovascular accidents as CVD risk factors were reported in only 43 patients (6.9%). Table 2 summarizes the distribution of cardiovascular risk factors among the pooled sample.

Clinical presentation

Clinical characteristics, in-hospital treatment and treatment at discharge of acute MI patients under investigation are summarized in Table 3.

Acute chest pain was the presenting complaint in 558 (89.7%) patients. Other presenting symptoms included nausea and vomiting in 441 (70.9%) and epigastric pain in 109 (17.5%). Data on duration of symptoms prior to presentation at the hospital were available for 576 patients. In 35.9% of these cases the duration was > 12 hours. Mean duration of stay in the coronary care unit was 4.0 (SD 2.9) days, range 0–28 days. Of the 480 (77.0%) patients who were discharged, 128 (26.7%) had stayed in

hospital for < 8 days, 251 (52.3%) had stayed for 8–14 days while 101 (21.0%) patients had stayed > 14 days. Eleven (1.8%) patients had a cardiac arrest at presentation and 7 of these (63.6%) died during the study period. Seventeen (2.7%) the patients presented in cardiogenic shock, with a mortality rate of 13 (76.5%). Acute pulmonary oedema was the presenting clinical feature in 23 (3.7%) patients, 5 of whom (21.7%) died.

Laboratory investigations

All of the patients included in the study had abnormal ECG. The different ECG patterns at presentation are shown in Table 3. Furthermore, the CK value at presentation was more than the upper limit of the normal reference range (167 IU/L) in 514 (82.6%) patients; the mean CK value was 1084 (SD 1144) IU/L (range 21–7617 IU/L) in the patients studied. Elevated LDH levels

at presentation were above the upper limit of the normal reference range (480 IU/L) in 443 (71.2%) patients; the mean LDH value was 1034 (SD 839) (range 51–9182 IU/L).

Management

Aspirin, beta-blockers, streptokinase and ACE inhibitors were the most important drug or drug groups used by the patients under investigation in the hospital during the study period. Aside from cases that had contraindications for their use, the rate of use of thrombolytic therapy was low in certain groups of patients. These include female sex (40.4% compared with 58.4% for males), old age (31.6% for those ≥ 85 years compared with 63.3% for patients < 55 years), patients with diabetes (45.3% compared with 62.0% for non-diabetic patients), and patients with hypertension (47.3% compared with 57.8% for non-hypertensive patients).

Discussion

CHD continues to be one of the major causes of morbidity and mortality among women as well as men in many countries [1,5]. CHD is much less frequent in premenopausal women than in age-matched men [12]. This essentially shifts the incidence curves for women by 5–10 years compared with men [13]. Acute MI below the

Table 2 Comparison of cardiovascular risk factors between the sexes

Risk factor	Males (n = 417)		Females (n = 151)		Total (n = 622)	
	No.	%	No.	%	No.	%
Diabetes	202	42.9	98	64.9	300	48.2
Hypertension	147	31.2	75	49.7	222	35.7
History of coronary artery disease	100	21.2	35	23.2	135	21.7
History of cerebrovascular accident	22	4.7	10	6.6	32	5.2
History of hyperlipidaemia	11	2.3	0	0.0	11	1.8
	(n = 366)		(n = 91)		(n = 457) ^a	
Current smoker	229	62.6	2	2.2	231	50.6
Ex-smoker	64	17.5	1	1.1	65	14.2

^aSmoking history was only available for 457 patients.

Table 3 Clinical characteristics and treatment in acute myocardial infarction patients admitted to coronary care unit at Tripoli medical centre (n = 622)

Variable	No.	%
Presenting symptoms		
Chest pain	558	89.7
Nausea and vomiting	441	70.9
Epigastric pain	109	17.5
Breathlessness	89	14.3
Dizziness	62	10.0
Fatigue	58	9.3
Duration of stay in hospital (days)^a		
< 8	128	26.7
8-14	251	52.3
> 14	101	21.0
In-hospital treatment		
Aspirin	562	90.4
Beta-blocker	363	58.4
Streptokinase	336	54.0
ACE inhibitor	263	42.3
ECG location		
Anterior	389	62.5
Inferior	203	32.6
Subendocardial	20	3.2
Posterior	6	1.0
Right ventricle	4	0.6
Duration of symptoms prior to presentation (hours)^b		
< 4	185	32.2
4-6	83	14.4
7-12	101	17.5
> 12	207	35.9
Treatment at discharge^c		
Aspirin	406	91.6
Beta-blocker	233	52.6
ACE inhibitor	213	48.1

^aFor 480 discharged patients (patients who left against medical advice were excluded); ^bData available for 576 patients; ^cTreatment at discharge was available for 443 patients.

ACE inhibitor = angiotensin converting enzyme inhibitor; ECG = electrocardiograph.

fourth decade is predominantly a disease of men [2]. In the present study, more than three-quarter of patients included (75.7%) were male (i.e. a male to female ratio 3.1:1). This is similar to the results from communities in some industrialized countries [14]. However the ratio is lower than the 6:1 ratios in studies from some other Arab countries [15].

Our results showed that the sex ratio was related to age, with the male

to female ratio being 6.6:1 in patients younger than 60 years of age and 2.1:1 in older patients. This ratio is similar to the sex ratio recorded in 2 British communities [14] and reflects the fact that women with acute ischaemic syndromes tend to be older than men with such syndromes [16]. In the present study, the ratio of the number of patients > 60 years of age to those ≤ 60 years was 1.0:1 in male patients and 3.3:1 in female patients

Diabetes is a major independent predictor of morbidity and mortality in acute MI [7], probably through its associations with pre-existing left ventricular dysfunction and diffuse and rapidly progressive coronary atherosclerosis [17]. The current data indicated that 48.2% of all patients hospitalized at Tripoli medical centre with acute MI had diabetes. This is higher than the 10.5% to 30.0% reported in the other studies conducted in south Asian and white patients in Britain [17] and 3 times greater than that of participants with diabetes among Saudi Arabian MI patients [15,18]. This reflects the high burden of diabetes in our population, and suggests that more aggressive strategies need to be directed towards primary prevention among this vulnerable group.

Hypertension, another well-established cardiovascular risk factor, was present in 35.7% of patients. Hypertensive individuals more frequently have symptoms preceding acute MI, probably due to ventricular hypertrophy associated with high blood pressure [5]. Women with acute ischaemic syndromes have higher rates of associated diabetes and hypertension because the protective effects of the premenopausal state can probably be overcome by these 2 potent causes of atherosclerosis [13].

The effect of cigarette smoking on the risk of MI has long been investigated and the results of one recent study suggested that cigarette smoking played the most important role in MI in individuals under the age of 36 years [19]. Smoking increases the risk of an initial cardiac event and doubles the rate of subsequent infarction and death [6]. The association between cigarette smoking and a high cholesterol level is well established [20]. This may reflect the higher intake of dietary fat and cholesterol among smokers or the metabolic effects of cigarette smoke metabolites [20]. As the number of cigarettes smoked per day increases so the cholesterol level rises in both males

and females [20]. Our results showed that smoking was an important risk factor among Libyan male patients. Of the 366 patients in the present study group for whom smoking history was available, 17.5% were ex-smokers and 62.6% were current smokers. This is comparable with the range of current smoking history among males with acute MI found in some other studies [17]. On the other hand, in industrialized

countries the range of smoking in females can be high and approach the male range [14]. However, this is quite different from the female smoking habits in our sample. Few women smoke in the Libyan community [21]. Our study showed that only 2 female patients (1.3%) were current smokers. This is similar to the findings of another study conducted in Libya and reported elsewhere [21].

Conclusion

In view of the high inpatient mortality risk among acute MI patients in the present investigation public health planners and clinicians should be aware of the importance of early diagnosis of MI and the ensuing burden of various cardiovascular risk factors so that appropriate primary and secondary prevention strategies can be implemented.

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