

Original Research

Epidemiology of Acute Coronary Syndromes in the Mediterranean Island of Cyprus (CYPACS Study, Cyprus Study of Acute Coronary Syndromes)

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Key words:

**Epidemiology,
acute coronary
syndromes, Cyprus,
Mediterranean.**

Manuscript received:
March 9, 2013;
Accepted:
September 18, 2013.

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Introduction: So far, no studies have been performed regarding the epidemiology and management of acute coronary syndromes (ACS) in Cyprus. The aim of the present study was to enroll a representative sample of patients in order to study the epidemiology and management of ACS in the Mediterranean island of Cyprus.

Methods: For a period of 12 months, all patients admitted to Nicosia General Hospital with an ACS were studied. The calculation of the annual incidence of ACS was based on the number of all ACS cases registered during one year in the Nicosia district. The results from the province of Nicosia can be considered as representative of the whole ACS profile in Cyprus.

Results: The annual incidence of ACS in the Nicosia district was 160 per 100,000 inhabitants (41 per 100,000 women and 282 per 100,000 men). This percentage translates into 1342 ACS episodes annually among the Cypriot population. The ratio of men to women was 6.8:1. More female ACS patients than men had hypertension (67.3% vs. 46.3%, $p=0.005$) and were passive smokers (53.8% vs. 47.7%, $p=0.4$), while male patients with ACS included a significantly greater percentage of smokers compared to women (51.3% vs. 13.5%, $p<0.001$). Regarding the type of ACS, 45% of patients were diagnosed with STEMI, 41.3% with NSTEMI and 13.7% with unstable angina. The majority of patients with STEMI were treated with medical reperfusion. The in-hospital mortality rate was 3.5%.

Conclusions: The annual incidence of ACS in Cyprus is below the European average. The management of ACS is similar to that in southern Europe. The majority of patients with STEMI are treated with pharmacological reperfusion. The small geographical area of the island provides the advantage of early reperfusion to the majority of patients, which results in very low in-hospital mortality.

Acute coronary syndromes (ACS) are a major cause of death and disability in the developed countries of the world. Several epidemiological studies from European countries¹⁻¹⁰ have led to important conclusions regarding the prevalence, the type of presentation, and the treatment of ACS in western Europe. These studies also showed geographic differences and heterogene-

ity in the care and mortality of patients with ACS throughout Europe.¹⁰ Cyprus is the third largest island in the Mediterranean area, at the southern end of Europe, with a population of less than one million people. It is situated at the crossroads of three continents: Europe, Asia, and Africa. So far, only a few studies have been performed regarding the epidemiology and management of ACS in this Med-

iterranean region; therefore, data concerning Cyprus are scarce.

The aim of the present study was to record and study the epidemiology of ACS in Cyprus. Specifically, the annual incidence of ACS, the prevalence of coronary artery disease risk factors, the clinical characteristics, and the treatment and outcomes of ACS patients in Cyprus were studied.

Methods

Study design and patient population

The study protocol was similar to the one used in the GREECS⁶ study in Greece, with some modifications to adjust it to the Cypriot population. All patients included in the study were residents of Nicosia province – the largest region of Cyprus, with a population of 315,400 people – and were admitted to Nicosia General Hospital for an ACS during the 12-month period from January to December 2009. Patients transferred from another province and patients who were residents of another province apart from Nicosia were excluded from the study.

The population of patients with ACS across Cyprus was considered homogeneous; therefore, the results from Nicosia province can be considered as representative of the whole ACS population in Cyprus. Information concerning the patients' personal and family history was included in the study protocol. Patients were classified into three categories of ACS, according to the European Society of Cardiology guidelines:¹⁵ A – Acute coronary syndrome with persistent ST-elevation (STEMI); B – Patients who had ACS without ST-elevation (NSTEMI-ACS) were classified, according to the presence or not of high troponin levels, as: B1 – myocardial infarction without persistent ST-elevation (NSTEMI), or B2 – unstable angina. The recording of activity level,¹⁶ nutritional habits,¹⁷ and depression¹⁸ was based on the GREECS study protocol.⁶

Statistical analysis

The statistical analysis was performed using Excel and the IBM PASW (Chicago IL, USA) statistics package. Descriptive analysis and inferential analysis were performed for all variables of the study. The dispersion was calculated and frequency tables were created according to the type of variable. For quantitative variables, the mean value and the standard deviation were calculated, while categorical values were

expressed as relative and absolute frequencies. Statistical tests were used to measure and assess the results, including proportion, chi-square test and Fisher's exact test for categorical variables, and t-test and dispersion analysis (ANOVA) for quantitative values. Bonferroni multiple comparisons were used for testing percentage variables. A 95-99% confidence interval was used for all cases.

The study was approved by our clinic's scientific committee for medical research, and was performed according to the declaration of Helsinki (1989) of the World Medical Association.

Results

From January to December 2009, 408 patients with an ACS were enrolled, 356 were men (87.3%) and 52 were women (12.7%). The ratio of men to women was 6.8 to 1.

Age and sex distribution of ACS patients

The mean age of the men was 62.28 ± 12 years while the mean age of the women was 70.27 ± 12 ($p < 0.001$). The distribution of the patients according to age and sex is shown in Figure 1. The highest percentage of men presenting with an ACS was in the 50-59 year-old group, while the highest percentage of women was in the 70-79 year-old group.

Annual incidence of ACS and seasonal, monthly, and daily distribution

According to the Cyprus Statistical Service,¹⁹ the Nicosia district population in 2009, when the study was performed, included 315,400 inhabitants (156,300 males and 159,100 females). The calculation of the annual incidence of ACS in Nicosia district was based on the number of all ACS patients registered for a year in all Nicosia district hospitals: 356 men and 52 women were admitted to Nicosia General Hospital, while 85 men and 13 women were admitted to private hospitals in Nicosia. Based on the sum of the above data, we calculated the annual ACS incidence of Nicosia district to be 160 per 100,000 inhabitants (282 per 100,000 men and 41 per 100,000 women). No difference was noted in the incidence of ACS between urban and rural areas (urban areas: 160 ACS per 100,000 and rural areas 159 ACS per 100,000 inhabitants, $p = \text{NS}$).

The distribution of ACS patients according to the day of admission is shown in Figure 2. Most pa-

tients were admitted during the first days of the week ($p=0.029$ between Monday and Sunday and $p=0.04$ between Monday and Saturday). Most admissions happened during January or December (Figure 3),

whereas June and July were the months with the lowest number of admissions ($p=0.048$ between January and June). A seasonal variation of ACS was noted from observation of the monthly distribution.

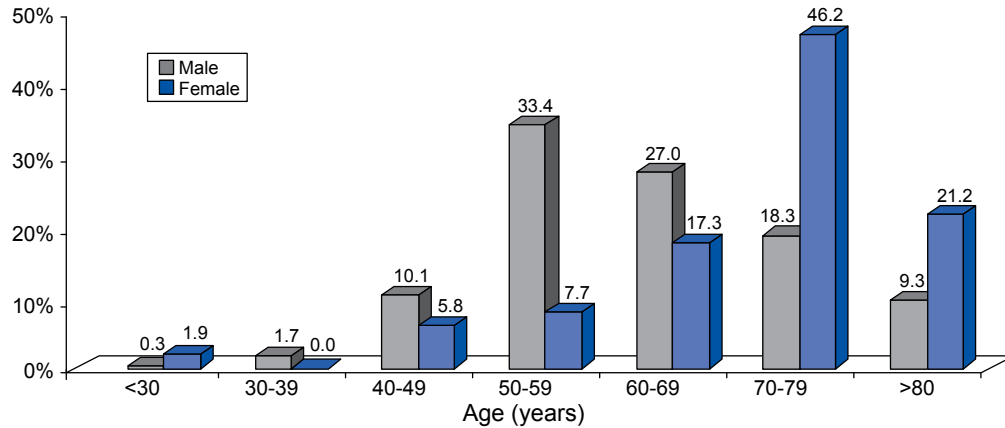


Figure 1. Distribution of patients with an acute coronary syndrome according to age and sex.

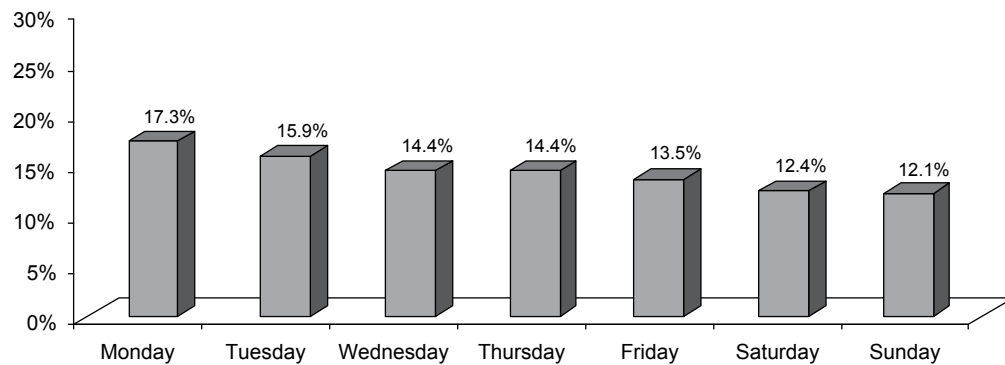


Figure 2. Distribution of patients with an acute coronary syndrome according to the day of admission.

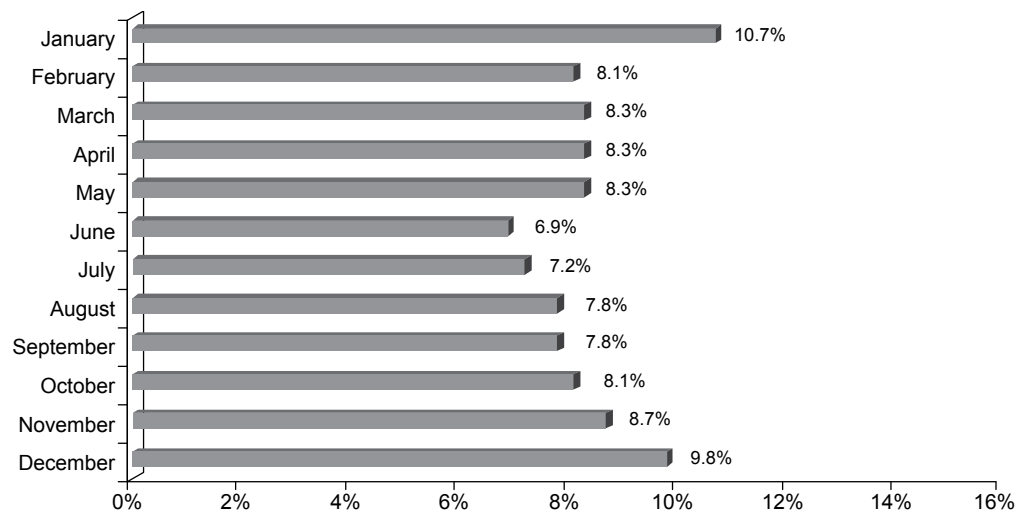


Figure 3. Distribution of patients with an acute coronary syndrome according to the month of admission to hospital.

More patients with ACS (53.2%) were admitted during the colder months of the year (October-March), while 46.8% of the patients were admitted during the warmer months of the year ($p=0.017$, between colder and warmer months).

Classification of patients according to the type of ACS

Based on the ESC criteria,¹⁵ 45% of patients (male: 44.7%, female: 47.1%, $p=0.59$) were diagnosed with STEMI, 41.3% of patients (male: 41%, female: 43.1%, $p=0.92$) with NSTEMI, and 13.7% of patients (male: 14.3%, female: 9.8%, $p=0.36$) with unstable angina. The distribution of ACS types according to age and sex is shown in Table 1. It was noted that STEMI was the most common form of ACS in patients aged 40-49 years ($p=0.05$ between STEMI/NSTEMI and STEMI/unstable angina), whereas NSTEMI was most common in those aged 50-59 years ($p=0.08$ between NSTEMI/unstable angina). In patients aged 60-69 years and above 80 years old, unstable angina was the most common type of ACS ($p=0.08$ between STEMI/unstable angina).

Reperfusion therapy and in-hospital management of patients with ACS

Medical reperfusion was used to treat 74.4% of patients with STEMI, while only 1.6% of STEMI patients were treated with mechanical reperfusion. Rescue PCI was required in 13.7% of STEMI patients. No difference between men and women was noted regarding treatment with medical reperfusion in patients with STEMI (75.5% of men and 68% of women, $p=0.36$).

GP IIb/IIIa receptor inhibitors were administered to 69% of NSTEMI patients and 36% of patients with unstable angina. Coronary angiography

was performed in 69.1% of ACS patients during their hospitalisation, 72.8% of men and 44.2% of women ($p<0.01$). Coronary angiography was performed in 72.6% of men and 40% of women with STEMI ($p<0.001$), in 73.6% of men and 45% of women with NSTEMI ($p<0.001$), and in 70.6% of men and 60% of women with unstable angina ($p<0.04$).

Duration of hospitalisation

The mean duration of hospitalisation for ACS patients was 6.8 days (median: 7, Q1=6 [25%], Q3=7 [75%]). There was no significant difference between men and women in the duration of hospital stay. However, a statistically significant difference in the length of hospital stay was noted between types of ACS. The mean hospital stay for STEMI and NSTEMI patients was 7.6 days and 7.1 days, respectively, while patients with unstable angina were hospitalized for a significantly shorter duration, with a mean duration of hospitalization 4.8 days ($p=0.05$; median: 5, Q1=4 [25%], Q3=6 [75%]).

In-hospital mortality

The in-hospital mortality was 3.5% (3.3% for men and 4.8% for women, $p=0.435$). No deaths were recorded among patients younger than 49 years. The mortality rate was 2.7% for patients aged 50-59 years, 2.9% for those aged 60-69 years, and 6.6% for those aged 70-79 years. The in-hospital mortality of STEMI was 4% and that of NSTEMI was 3.4% ($p=NS$). No deaths were recorded in the unstable angina group.

Discharge medications

B-blockers were prescribed to 68.2% of patients, aspirin to 78.4%, statins to 74%, clopidogrel to 64.2%, angio-

Table 1. Classification of patients with acute coronary syndrome according to type of presentation and age.

Age (years)	STEMI (%)	NSTEMI (%)	Unstable angina (%)	p1	p2	p3
<30	1.1	0.0	0.0			
30-39	1.1	1.2	3.6			
40-49	13.2	7.1	5.4	0.05	0.05	0.32
50-59	29.7	33.4	21.4	0.43	0.22	0.08
60-69	27.5	22.4	30.3	0.26	0.33	0.22
70-79	19.2	24.1	23.2	0.26	0.51	0.89
>80	8.2	11.8	16.1	0.26	0.08	0.40
Total	100.0	100.0	100.0			

p1: STEMI vs. NSTEMI; p2: STEMI vs. unstable angina; p3: NSTEMI vs. unstable angina. STEMI – myocardial infarction with persistent ST-elevation; NSTEMI – myocardial infarction without persistent ST-elevation.

tensin-converting enzyme (ACE) inhibitors to 47.3%, nitrates to 35.3%, diuretics to 12%, angiotensin receptor blockers (ARBs) to 9.8%, calcium channel blockers to 4.7%, and aldosterone antagonists to 2.9% of patients. No statistically significant differences were noted in discharge medications between men and women.

Family and personal medical history of patients with ACS

A family history of early coronary artery disease was present in 34.6% of ACS patients (34.6% of men and 34.6% of women, $p=NS$). The personal medical history for hypercholesterolemia was positive in 49% of patients (48.3% of men and 53.8% of women, $p=0.45$). A history of hypertension was present in 49% of patients (46.3% of men and 67.3% of women, $p<0.001$) and a history of diabetes mellitus in 27.9% of patients (27.2% of men and 32.7% of women, $p=0.41$) (Table 2). With regard to the smoking habit, 48% of ACS patients were smokers (53.1% of men and 13.5% of women, $p<0.001$), while 48.7% were passive smokers (47.7% of men and 53.8% of women, $p<0.05$). According to body mass index, 78.4% of ACS patients weighed more than normal limits, with 54.7% being overweight (55.1% of men and 51.9% of women, $p=NS$) and 23.7% being obese (24.2% of men and 21.2% of women, $p=NS$). Only 21.6% of patients were considered to be of normal weight (20.8% of men and 26.9% of women, $p=NS$). The prevalence of risk factors according to age and sex is presented in Tables 2 and 3.

Level of education, family status, nutritional habits, level of exercise and depression of patients with ACS

No statistically significant correlation was observed between the level of education and the type of ACS. The evaluation of family status revealed that married men had a higher possibility of suffering an ACS than married women (men: 84.1% vs. women: 42.9%, $p<0.001$). Also, widowed women had a higher risk of suffering an ACS in comparison with widowed men (women: 49% vs. men: 5.8%, $p<0.001$). There was no significant correlation between family status and type of ACS.

Regarding the level of activity, although a higher percentage of men than women engaged in exercise, the difference was not statistically significant ($p=0.113$). The nutrition index was 28.1 ± 9 among ACS patients and was slightly higher, though not statistically significantly so, in men than in women (men: 28.5 ± 9 vs. women: 26.7 ± 5 , $p=NS$). A higher value of nutrition index indicates a better adjustment to a typical Mediterranean diet. There was no statistically significant difference in nutrition index between the types of ACS. Depression index was 20.6 ± 8 . No statistically significant difference was noted between men and women with an ACS (men: 20.8 ± 8 vs. women: 19.8 ± 6 , $p=0.092$), or between various types of ACS (STEMI: 20.9 ± 8 , NSTEMI: 21.4 ± 8 , unstable angina: 18.7 ± 9 , $p=0.18$).

Discussion

The present study analysed the epidemiological and

Table 2. Personal medical and family history of patients with acute coronary syndrome. Classification according to sex. Data given as %.

	Total	Male	Female	p
Body mass index (BMI):*				
Normal weight (BMI < 25 kg/m ²)	21.6	20.8	26.9	0.314
Overweight (BMI > 25-29.9 kg/m ²)	54.7	55.1	51.9	0.671
Obese (BMI > 29.9 kg/m ²)	23.7	24.2	21.2	0.634
Family history:				
Early coronary artery disease	34.6	34.6	34.6	0.993
Arterial hypertension	38.5	37.4	46.2	0.223
Hypercholesterolaemia	29.4	30.3	23.1	0.283
Diabetes mellitus	33.6	33.1	36.5	0.628
Personal medical history:				
Arterial hypertension	49.0	46.3	67.3	0.005
Hypercholesterolaemia	49.0	48.3	53.8	0.456
Diabetes mellitus	27.9	27.2	32.7	0.410
Smoking	48.0	53.1	13.5	0.001
Passive smoking	48.7	47.7	53.8	0.411
Previous coronary artery disease	31.6	32.9	23.1	0.156

*p-value for all BMI 0.593.

Table 3. Classification of acute coronary syndrome risk factors according to age and sex. Data given as %.

	<49 years	50-69 years	>70 years	p1	p2	p3
All patients:						
Overweight (BMI>25-29.9 kg/m ²)	51.1	54.4	56.4	0.825	0.795	0.835
Obese (BMI>29.9 kg/m ²)	23.4	25.9	20.3	0.908	0.918	0.533
Family history of early CAD	42.6	38.2	25.6	0.574	0.029	0.014
Arterial hypertension	23.4	47.4	60.9	0.003	<0.001	0.013
Hypercholesterolaemia	48.9	52.6	42.9	0.644	0.471	0.073
Diabetes mellitus	6.4	26.8	37.6	0.003	<0.001	0.031
Smoking	68.1	57.9	24.1	0.195	<0.001	<0.001
Men:						
Overweight (BMI>25-29.9 kg/m ²)	53.5	54.9	56.1	0.913	0.875	0.902
Obese (BMI>29.9 kg/m ²)	23.3	26.0	20.4	0.903	0.916	0.543
Family history of early CAD	41.9	38.1	23.5	0.648	0.027	0.011
Arterial hypertension	20.9	47.4	55.1	0.001	<0.001	0.209
Hypercholesterolaemia	51.2	52.1	38.8	0.911	0.171	0.029
Diabetes mellitus	7.0	26.5	37.8	0.006	<0.001	0.044
Smoking	72.1	59.5	30.6	0.122	<0.001	<0.001
Women:						
Overweight (BMI>25-29.9 kg/m ²)	25.0	46.2	57.1	0.453	0.203	0.612
Obese (BMI>29.9 kg/m ²)	25.0	23.1	20.0	0.836	0.805	0.875
Family history of early CAD	50.0	38.5	31.4	0.682	0.455	0.646
Arterial hypertension	50.0	46.2	77.1	0.893	0.239	0.04
Hypercholesterolaemia	25.0	61.5	54.3	0.200	0.267	0.653
Diabetes mellitus	0.0	30.8	37.1	0.205	0.135	0.682
Smoking	25.0	30.8	5.7	0.825	0.170	0.02

p1: <49 years vs. 50-69 years; p2: <49 years vs. >70 years; p3: 50-69 years vs. >70 years. BMI – body mass index; CAD – coronary artery disease

clinical characteristics, in addition to the in-hospital course and therapeutic approach, of patients hospitalised for ACS in Nicosia General Hospital, Cyprus, during the one-year period from January to December, 2009. Although private hospitals in Nicosia district also admit ACS patients, the majority of patients with ACS are admitted or referred to Nicosia General Hospital, and the population of patients studied can be considered as representative of the cases of ACS occurring across the Nicosia district. As mentioned above, the ACS population throughout Cyprus is considered to be homogeneous, so that the results from Nicosia region can be considered representative of the total population of ACS patients in Cyprus.

Incidence of ACS in the Cypriot population

The annual incidence of ACS in the Nicosia district was calculated at 160 ACS per 100,000 inhabitants. This percentage translates into 1342 ACS episodes annually in the Cypriot population. No difference was observed in the annual incidence of ACS between the inhabitants of the urban and rural regions of the Nicosia district. In comparison with the other European

countries,¹⁰ the annual incidence of ACS in Cyprus was below average (Europe: 190 ACS per 100,000 population). Compared to neighboring countries, the annual incidence of ACS is slightly higher in Cyprus than in Israel (136 per 100,000) but significantly lower than in Turkey (312 per 100,000 inhabitants). In comparison with Greece, where there are similar historical and cultural conditions, the annual incidence of ACS in Cyprus was relatively lower. In the GREECS study,⁶ the annual incidence of ACS was 226 per 100,000 inhabitants, while in the HELIOS study⁷ it was 185 per 100,000 inhabitants.

According to sex, the annual incidence of ACS was significantly lower in women than in men (41 ACS per 100,000 women vs. 282 ACS per 100,000 men). The lower incidence of ACS in the female population may be attributed to the lower percentage of women with ACS who smoke (13.5% of women as opposed to 51.3% of men, $p=0.001$). According to the GREECS study,⁶ the annual incidence of ACS in Greece was 340 ACS per 100,000 men and 110 ACS per 100,000 women. In different regions of Great Britain¹⁰ the annual incidence of ACS was 273-823 per 100,000 men and 66-256 per 100,000 women.

Age of presentation of ACS

The mean age was lower in men with ACS than in women (men: 62.2 ± 12 years vs. women: 70.2 ± 12 years, $p < 0.01$). These findings are similar to those of the Greek HELIOS study,⁷ where the mean age of men was 65 ± 12 years and of women 74 ± 10 years. The mean number of admissions of patients with ACS in Nicosia General Hospital was 1.1 ± 2 patients per day. For all hospitals in the Nicosia district the mean number of admissions of patients with ACS was 1.6 ± 1 per day.

Seasonality

A degree of seasonal distribution was observed in the admissions of patients with ACS. More admissions were observed during the winter months in comparison with the summer months, and more admissions were observed during January and December, with fewer admissions in June and July. The same findings were observed in an older study of acute myocardial infarction amongst the Cypriot population,¹¹ as well in the HELIOS⁷ study in Greece, and in a study of 64,191 cases with ACS in Italy.²⁵ It is known that there is an increased incidence of ACS during the winter months and a lower incidence during the summer months.²²⁻²⁴ The fact that the temperature drop is related to an increased risk for ACS creates the suspicion that the cold weather is likely to cause changes in blood pressure, blood lipids, and blood in coagulation mechanisms. The majority of admissions for ACS were on Monday, followed by a decline during the week until Sunday, when fewer admissions were observed. Similar results were observed in Greece⁷ and in Italy.²⁵ The higher frequency of ACS on Mondays was attributed to the stress of returning to work after the weekend break.²⁶

Baseline characteristics and predisposing factors

The most frequent coronary artery disease risk factors observed in this ACS population in Cyprus were arterial hypertension and dyslipidemia, both in 49% of patients, smoking in 48%, and diabetes mellitus in 27.9%. A large percentage of the patients were obese (54.7%) and only 21.6% had normal body weight, according to the body mass index. The prevalence of these risk factors among the ACS population in Cyprus was lower than in the Greek population with ACS, mainly as far as arterial hypertension, obesi-

ty and smoking were concerned.⁷ Hypertension and obesity were observed in 59% and 73% of Greek patients with ACS,⁷ compared to 49% and 54.7% of Cypriot patients. A higher percentage of patients with ACS in Greece were smokers (73%) compared to those in Cyprus (48%). As far as diabetes mellitus and dyslipidemia are concerned, there was no difference in the frequency of these factors between patients with ACS in Cyprus and Greece.

The major predisposing factor for men was smoking (53.1%), while for women it was arterial hypertension (67.3%). Female ACS patients had a greater incidence of hypertension (women: 67.3% vs. men: 46.3%, $p = 0.005$). Male patients with ACS included a significantly greater percentage of smokers compared to women (men: 51.3% vs. women: 13.5%, $p < 0.001$), whereas there was no significant difference in passive smoking (women: 53.8% vs. men: 47.7%, $p = 0.4$). These findings are similar to an older study of ACS in Cyprus,¹¹ in which it was observed that the most frequent predisposing factor in men was smoking (41.9%), while in women it was hypertension (51.7%).

In relation to the age of the patients with ACS, it seems that for ages under 49 years the main predisposing factors for ACS were smoking, family history of coronary artery disease, and dyslipidemia. In the middle-aged decades (50-69 years old), the main predisposing factors were smoking and dyslipidemia, while at older ages, over 70 years, the main predisposing factor for ACS was hypertension. These observations suggest a more targeted treatment of risk factors in relation to the patients' age and sex.

NSTEMI was the most common form of ACS among patients with a previous history of coronary artery disease (NSTEMI: 48.8%, STEMI: 32.6%, unstable angina: 18.6%, $p < 0.05$ among all ACS groups), while STEMI was the most common form of ACS among patients without previous coronary artery disease (STEMI: 50.2%, NSTEMI: 38.4%, unstable angina: 11.5%, $p < 0.05$ among all ACS groups).

The nutritional habits and depression index showed no significant differences, either between men and women with ACS, or between patients with STEMI, NSTEMI, or unstable angina.

Clinical manifestation and treatment of ACS

In this study, the most common type of ACS was that without persistent ST elevation. These findings are consistent with the findings in the literature and with

scientific data from recent surveys,^{2,3,28} which indicate that ACS episodes are more common today in the form of NSTEMI-ACS, rather than in the form of STEMI. The relationship between STEMI and NSTEMI-ACS has changed over the years, resulting in an increase of NSTEMI-ACS, though there is no clear explanation for this change. It is possibly due to the significant efforts aimed at prevention of coronary heart disease over the past 20 years.

Based on the guidelines of the European Society of Cardiology,¹⁵ patients with STEMI should be treated within 6 hours from the onset of pain by medical or mechanical reperfusion. A total of 76% of patients with STEMI in this study underwent reperfusion therapy. Specifically, 74.4% of STEMI patients were treated with medical reperfusion, and 1.6% with mechanical reperfusion (primary percutaneous coronary intervention, PCI). It is likely that the percentage of the latter cases in the studied population is higher than in the rest of the country, given that most hospitals in smaller cities of Cyprus do not have cardiac catheterisation laboratories.

The treatment of patients with STEMI varies among European countries.¹⁰ These differences are most pronounced between the countries of northern, central and western Europe, where mainly mechanical reperfusion therapy (primary PCI) is performed in 60-90% of STEMI patients, and countries of southern Europe and the Balkans, where treatment with medical reperfusion (thrombolysis) still predominates.¹⁰ A study of the reperfusion treatment of STEMI in 30 European countries¹⁰ showed that overall reperfusion therapy (thrombolysis or primary angioplasty) ranged from 37% to 92% of patients, according to the country (Czech Republic: 93% of patients received reperfusion therapy, 92% mechanical and 1% medical reperfusion; Germany: 89% received reperfusion therapy, 81% mechanical and 7% medical reperfusion; Belgium: 80% received reperfusion therapy, 59% mechanical and 31% medical reperfusion; France: 61% received reperfusion therapy, 33% mechanical and 28% medical reperfusion; and the UK: 79% received reperfusion therapy, 24% mechanical and 55% medical reperfusion).

In the neighbouring countries of Cyprus, the Greek HELIOS⁷ study showed that approximately 41% of patients with STEMI were treated with thrombolysis, 9% with primary angioplasty, while 50% did not receive any reperfusion therapy. In Turkey, according to the TUMAR Registry,¹⁰ similar results were observed, where only 29% of ACS patients received medical reperfusion therapy, 8% were treat-

ed with primary angioplasty and 63% did not receive any reperfusion therapy. In Israel, based on the ASCIS Registry,¹⁰ 49% of patients with STEMI were treated with primary PCI, 16% with thrombolysis, and 35% with no reperfusion therapy. These numbers have changed during the last four years, after the initiation at the end of 2008 of the "Stent for life" program, when primary PCI was recommended as the dominant reperfusion therapy in the majority of European countries.

The present study shows that the percentage of patients with STEMI in Cyprus who are treated with reperfusion therapy (pharmacological or mechanical) is among the highest in Europe. The largest percentage of patients with ACS/STEMI in Cyprus are treated with pharmacological reperfusion (74.4%). This percentage has increased significantly since 1996, when only 45.2% of patients with acute myocardial infarction were treated with pharmacological reperfusion.³² Unfortunately, in Cyprus there is not a 24 hours a day, seven days a week, primary PCI service for STEMI patients, and for that reason the number of patients treated with primary angioplasty was low. According to the strategy program of the Ministry of Health in Cyprus this service will be available from July 2013. The beneficial effect of this treatment is well known compared with medical reperfusion, provided that it is implemented in accordance with the directives of the European Society of Cardiology,²⁶ within the first two hours of symptom onset. Recent studies of reperfusion therapy for patients with STEMI in Europe¹⁰ showed that the in-hospital mortality was lower in patients treated with primary angioplasty (2.7-8%) compared to patients treated with thrombolysis (3.5-14%).

Although the majority of patients with STEMI in Cyprus were managed by medical reperfusion, the in-hospital mortality of patients with ACS was quite low (3.5%). The mortality rate showed a significant decrease compared to Cypriot data from 1992,^{11,12} when the mortality was 8.7%, and is considerably lower than the mortality reported in studies from other countries. In Greece, and specifically according to the HELIOS⁷ study, the in hospital mortality was 7.7%, while in other European countries¹⁰ it ranged from 5-14%. Based on the above data, it appears that the in-hospital mortality of patients with ACS in Cyprus may be the lowest in Europe. This is probably due to the peculiarities of Cyprus, where the short distances between place of residence and hospital, the good road network, and patients' increasing awareness of

heart attacks result in transporting patients with ACS promptly to the hospital and treating them with reperfusion within a short period of time.

This observation confirms once again that one of the most important factors in the outcome of ACS patients is the rapid transfer to the hospital and the timely application of reperfusion therapy (pharmacological or mechanical). A study of 1100 patients with acute myocardial infarction hospitalised in Nicosia General Hospital in Cyprus³² from 1989 to 1993 showed that 45% of patients with acute myocardial infarction arrived at the hospital within 60 minutes, and 67% within 120 minutes from the onset of symptoms. The early arrival of patients with acute myocardial infarction was attributed to the small geographical area of Cyprus.

Pharmacological reperfusion is a satisfactory alternative therapy to reperfusion in patients with STEMI, especially for hospitals that do not have a catheterisation laboratory with an experienced staff. The beneficial effects of thrombolysis are widely known in patients undergoing prompt treatment. A meta-analysis of 22 studies³³ showed that thrombolysis was accompanied by a greater reduction in mortality when applied less than 120 minutes after the onset of symptoms. The CAPTIM³⁴ study, which compared patients with STEMI who were treated either with mechanical reperfusion (primary PCI), or with pharmacological reperfusion (thrombolysis) that was implemented early in the ambulance that transported the patient to the hospital, showed that patients who were thrombolysed within two hours after the onset of pain had a better prognosis regarding five-year survival than patients treated with primary PCI (mortality 5.8% as opposed to 11.1%, $p=0.04$).

According to ESC guidelines,¹⁵ the recommended medication that relates to increased life expectancy after an ACS includes aspirin, beta-blockers, ACE inhibitors or ARBs, and statins. The percentage of patients receiving statins at discharge (74%), was higher than that of the EuroHeart Survey of ACS,² where only 50% of patients were receiving statins, but lower than the proportion of patients in the Greek HELIOS⁷ study (82% of patients). ACE inhibitors or ARBs were also prescribed in a lower percentage (57.1%) than in other studies (GRACE³⁷: 68.8% and HELIOS⁷: 75%). Similarly, aspirin was prescribed in a slightly lower percentage than in the HELIOS⁷ study (78.4% vs. 88%). The prescription of beta-blockers showed a similar percentage to that in the HELIOS⁷ study (68.2% vs. 69.8%). The discharge

treatment of patients hospitalised for ACS in Cyprus was found to be comparable to the treatment followed in other European countries and in accordance with the official recommendations and guidelines of the European Society of Cardiology.¹⁵

Conclusions

We conclude that the management of ACS in Cyprus is similar to the treatment of ACS in southern Europe and in most neighbouring countries. Most patients with STEMI are treated during the in-hospital period with reperfusion therapy, mainly pharmacological. The high percentage of patients with ACS who undergo reperfusion therapy, in combination with the early arrival of patients at the hospital, due to the small distances in Cyprus, has led to a very low mortality rate (3.5%), perhaps the lowest in Europe. For the same reasons, there are all the preconditions for the application of primary PCI in all STEMI patients in Cyprus, as is predominantly the case in northern European countries. The simultaneous adoption of this practice will contribute to further improvement in the treatment of patients with ACS in Cyprus, and eventually to a reduction in the duration and cost of hospitalisation.

The incidence of ACS in the Cypriot population was 160 per 100,000 inhabitants (41 per 100,000 women and 282 per 100,000 men). Roughly, this means that in Cyprus three ACS episodes occur per 1000 men and four ACS episodes per 10,000 women. On this basis, it is estimated that every year 1342 patients are admitted to Cypriot hospitals with an ACS. There was no difference in the annual incidence of ACS between residents of urban and rural areas. In comparison with other countries of Europe, the annual incidence of ACS in Cyprus is about average.

The relatively lower incidence of ACS in Cyprus is probably due to public campaigns for the prevention of cardiovascular diseases and possibly to gradual changes in the lifestyle and dietary habits of Cypriots. However, the high rates of patients with ACS who are obese, do not exercise, are smokers, or have high cholesterol and hypertension should lead to targeted strategies systematically addressing the Cypriot population's interest in these factors.

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