Clinical findings and educational status in chest pain patients admitted to an emergency department. Report from a three-month survey at Be'sat hospital, Teheran, Iran

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Background. **Cardiovascular disease is a major cause of death in Iran. With regard to the socio-economic status, a low educational level is associated with a higher frequency of disease. The aim of this study was to investigate, in a developing country, the influence of educational level and gender on the prevalence of coronary artery disease and cardiovascular risk factors in patients with chest pain at the time of admission and after 3 months of follow-up.**

Methods. **We studied 240 consecutive patients (113 males, 127 females, age 16-97 years) who presented with chest pain believed to be of cardiac origin. The patients were admitted to a metropolitan hospital in Teheran from September 8, 2001 to December 8, 2001.**

Results. **Males were found to have a higher educational level than females (p = 0.0001). Females more frequently had a history of hypertension (44.9 vs 23%, p = 0.0001) and of diabetes mellitus (24.4 vs 11.5%, p = 0.01) and presented with more electrocardiographic abnormalities (37.0 vs 27.4%, p = 0.033) than males. Furthermore, patients with a low educational level were less likely to be on beta-blockers (23.9 vs 53.3%, p = 0.000), nitrates (20.2 vs 42.2%, p = 0.002) and acetylsalicylic acid (22.4 vs 50%, p = 0.000) compared to patients with a high educational level. Males were more often transported by ambulance to the hospital than females (p = 0.001). There was a high prevalence of risk factors for ischemic heart disease (cigarette smoking, diabetes mellitus, hypertension and dyslipidemia) (65% had one or more risk factors) with no relation to educational level.**

Conclusions. **We found a high prevalence of risk factors for coronary artery disease in an Iranian population admitted with chest pain. In particular less educated women were at an increased risk and had more electrocardiographic abnormalities. Our findings stress the importance of the socio-economic status in cardiovascular disease and of the need for health promotion and lifestyle changes.**

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Coronary heart disease is the leading cause of death among males > 40 years and females > 65 years[1] and it is expected to remain the leading cause of death until 2020[2,3]. In the past 30 years cardiovascular mortality has declined in developed countries while an increase has been observed in developing countries[4].

In the present study we performed a survey of consecutive patients presenting with angina pectoris and acute myocardial infarction admitted to the emergency ward in one of the busiest hospitals in Iran. Our aim was to describe the clinical features, treatment, and in-hospital prognosis of patients presenting with cardiac chest pain in a metropolitan hospital of a developing country. We hypothesized that a low socio-economic status and level of education and male sex would be associated with a higher prevalence of coronary risk factors and ischemic heart disease.

Methods

We evaluated patients admitted with chest pain to the emergency department of the Be'sat hospital, Teheran, Iran during the 3-month period lasting from September 8, 2001 to December 8, 2001. All chest pain patients were seen by one of four general practitioners who worked in the emergency ward on a 24-hour shift basis. A total of 931 consecutive patients presented with chest pain. A non-cardiac cause of chest pain including pulmonary embolism, pneumothorax, gastroesophageal reflux and trauma, was excluded after history taking, physical exam, electrocardiography, laboratory testing and X-rays. Hence, 240 of the 931 patients were suspected of having ischemic heart disease and were included in the present study. Among the 240 patients, 175 patients were hospitalized in the coronary care unit. The remaining 65 patients remained in

the emergency department. Three patients died in the emergency department and the remaining 62 patients were discharged with a diagnosis of stable angina. These 62 patients were followed up as outpatients.

Various demographic data (age, gender, social status), risk factors (smoking, dyslipidemia, hypertension, diabetes), previous medical history (including cerebrovascular disease and myocardial infarction), other medical conditions, clinical and vital signs, electrocardiographic findings and biochemical markers (creatine kinase, lactate dehydrogenase, aspartate aminotransferase) were recorded. The diagnosis of coronary artery disease was initially based on non-invasive tests including, history taking, physical examination and electrocardiography. The serum titers of biochemical markers were also determined and among those who were hospitalized in the coronary care unit, coronary angiography was performed in a subset of patients but systematic angiography data were unavailable.

Pathological findings were defined as: dyslipidemia based on total cholesterol > 200 mg/dl and/or LDL cholesterol > 130 mg/dl[5] and hypertension defined as a systolic blood pressure > 140 mmHg and/or a diastolic blood pressure > 90 mmHg[6].

Stable angina pectoris was defined as chest pain without a change in frequency or pattern during the 6 weeks prior to admission. The pain could be controlled by rest or medication. Unstable angina pectoris was defined as chest pain at rest that was prolonged, usually lasting > 20 min or as new-onset angina classified in at least class III of the Canadian Cardiovascular Society classification[5]. Non-ST-elevation myocardial infarction was defined as novel ST-segment depression of at least 0.5 mV or T-wave abnormalities or both, in two or more contiguous leads with significant elevation of the myocardial necrosis markers. ST-elevation myocardial infarction was defined as new ST-segment elevation at the J point in two or more contiguous leads with the cut-off points ≥ 0.2 mV in leads V_1, V_2, or V_3 and ≥ 0.1 mV in the other leads[5,7]. Angina was classified as atypical when described as a pressure or discomfort in the chest, neck or arms which was not otherwise consistent with pain of myocardial ischemic origin.

All data were entered into a database (Epi Info, version 6.04 B, Centers for Disease Control, Atlanta, GA, USA, and World Health Organization, Geneva, Switzerland) and analyzed using SPSS for Windows, version 10.0.1 (SPSS Inc., Chicago, IL, USA). We used the χ^2 test or Fisher exact test for categorical variables and the Student's t-test for continuous variables. The ANOVA test was used for comparison between quantitative and qualitative variables.

Results

There is no previous report or study on the incidence and prevalence of non-surgical emergency admissions in Teheran. In the present study 240 consecutive cardiac chest pain patients were enrolled. Their data were collected for statistical analysis. No significant differences were found between males and females with regard to age and a history of dyslipidemia, cerebrovascular disease and antihypertensive drug therapy. Smoking and a higher educational level were more prevalent in males than in females (both p = 0.0001). Besides, males more frequently had a history of myocardial infarction but the trend was not significant. On the other hand, hypertension (p = 0.0001), diabetes (p = 0.01) and electrocardiographic abnormalities (p = 0.033) were more frequent in females. The main results are depicted in tables I and II. With respect to educational level, our patient population mainly consisted of subjects only with primary school education (42.9%). Patients with a university degree constituted 7.9% and had a mean age of 43.4 ± 11.7 years – much younger than the other patients (53.6 ± 14.3 years, p = 0.008). The level of education, coronary risk factors and cardiac medications are listed in table III.

In 72.5% of patients, chest pain manifested at rest while it was exercise-related in the remainder. In order of frequency, the most common pre/co-morbid risk factors were hypertension (34.6%), previous myocardial infarction (22.9%), dyslipidemia (22.5%), diabetes mellitus (18.3%), and previous cerebrovascular disease and stroke (8.3%).

Only 7.6% of patients were transported to the hospital by ambulance with a significant preponderance for males (83.3 vs 16.7%, p = 0.001).

All patients were followed up on the basis of the clinical judgment of the physician discharging them but these data were not systemically collected. Finally, 28 patients were diagnosed with myocardial infarction whereas angina pectoris was diagnosed in 212.

Discussion

In this study of 240 consecutive chest pain patients with angina pectoris and ischemic heart disease admitted to the emergency ward in a relatively poor metropolitan area in Teheran, Iran, we found that coronary risk factors and ischemic heart disease were unevenly distributed between genders and according to educational level. To our surprise, diabetes, hypertension, ST-segment changes and T-wave inversion were more frequent in women than in men. In a Turkish study, women, in comparison to men, were found to have a higher rate of positive electrocardiographic findings but a lower rate of previous myocardial infarction[8], but such differences were not found in our study. In general, women differ from men in terms of the presentation, type and prevention of coronary artery disease[9]. Despite similar cardiovascular risk factors in developed and developing countries, mortality and morbidity rates are different[10] and cardiovascular risk factors seem to

Table I. Cardiological data on admission.

	Males	Females	p
No. patients	113 (47.1%)	127 (52.9%)	NS
Age (years)	52.2 (16-85)	55.1 (24-97)	NS
Smoking			
Non-smokers	55 (48.6%)	102 (80.3%)	0.0001
Smokers	48 (42.4%)	11 (8.6%)	0.0001
Unknown	10 (8.8%)	14 (11%)	NS
Previous myocardial infarction	32 (28.3%)	23 (18.1%)	0.060
Diabetes	13 (11.5%)	31 (24.4%)	0.01
Dyslipidemia	20 (17.7%)	34 (26.8%)	NS
Hypertension	26 (23%)	57 (44.9%)	< 0.0001
History of cerebrovascular disease	8 (7.1%)	12 (9.4%)	NS
Educational level			
Uneducated	7 (6.1%)	28 (22%)	0.0001
Primary school	34 (30%)	69 (54.3%)	0.0001
High school	51 (45.1%)	20 (15.7%)	0.0001
University	17 (15%)	2 (1.5%)	0.0001
Unknown	4 (3.5%)	8 (6.3%)	NS
Drug therapy			
Beta-blockers	39 (34.5%)	50 (39.3%)	NS
Calcium antagonists	5 (4.4%)	13 (10.2%)	NS
ACE- or angiotensin II inhibitors	12 (10.6%)	26 (20.4%)	0.007
Nitrates	32 (28.3%)	38 (29.9%)	NS
Statins	10 (8.8%)	23 (18.1%)	NS
Diuretics	22 (19.4%)	38 (29.9%)	0.073
Acetylsalicylic acid	42 (37.1%)	39 (30.7%)	NS

Table II. Clinical and laboratory findings.

	Males	Females	p
Systolic blood pressure > 140 mmHg*	30 (28%)	38 (30.2%)	NS
Diastolic blood pressure > 90 mmHg*	20 (19%)	23 (18.5%)	NS
Non-ST-elevation myocardial infarction*	4 (3.5%)	9 (7%)	NS
ST-elevation myocardial infarction*	9 (7.9%)	6 (4.7%)	NS
Electrocardiographic findings*			
ST-segment depression	15 (13.2%)	34 (26.7%)	0.01
T-wave inversion	31 (27.4%)	47 (37%)	0.033
SVT or VT	20 (17.6%)	22 (17.3%)	NS
CCU hospitalization	85 (75.2%)	90 (70.9%)	NS
In-hospital mortality	2 (1.6%)	1 (0.7%)	NS

CCU = coronary care unit; SVT = supraventricular tachycardia; VT = ventricular tachycardia. * data recorded on admission in the emergency department.

be more prevalent in the urban compared to rural parts of developing countries[11].

Some studies have shown that low socio-economic status is associated with a higher frequency of cardiovascular risk factors[12] but at least in one study, it has been shown that in developing countries risk factors were significantly more frequent in middle and higher socio-economic groups[13]. Educational level was not associated with the incidence of ischemic heart disease or coronary risk factors in our study. However, this could be explained by the fact that patients with a higher education were generally better pharmacologically protected (beta-blockers and acetylsalicylic acid[14]) and younger than the admitted patients with a lower education. In contrast to previous studies reporting that women with cardiac disease are generally older than men[1,15,16], we found no significant age difference between sexes.

A low educational level has been shown to be an independent risk factor for ischemic heart disease and less educated subjects generally adopt a more adverse lifestyle than more educated individuals[17]. In our study, patients with an academic educational background had chest pain symptoms, but not confirmed ischemic heart disease, earlier in life compared to patients with non-academic educations. An epidemiological study addressing the risk of acute myocardial infarction has found an association between a low educational level

Table III. Relationship of education as the main component and factor of socio-economic status with other risk factors and drug therapy.

	Uneducated and primary school (n=138)	High school and university (n=90)	p
Smoking	28 (20.2%)	29 (32.2%)	NS
Systolic blood pressure > 140 mmHg	47 (34%)	18 (20%)	NS
Diastolic blood pressure > 90 mmHg	30 (21.7%)	10 (11.1%)	NS
Dyslipidemia	33 (23.9%)	20 (22.2%)	NS
Previous myocardial infarction	34 (24.6%)	18 (20%)	NS
Recent myocardial infarction*	21 (15.2%)	6 (6.6%)	NS
Drug therapy			
Beta-blockers	33 (23.9%)	48 (53.3%)	0.000
Calcium antagonists	7 (5%)	9 (10%)	NS
ACE- or angiotensin II inhibitors	22 (15.9%)	14 (15.5%)	NS
Nitrates	28 (20.2%)	38 (42.2%)	0.002
Statins	18 (13%)	14 (15.5%)	NS
Diuretics	36 (26%)	20 (22.2%)	NS
Acetylsalicylic acid	31 (22.4%)	45 (50%)	0.000

* in-hospital diagnosed myocardial infarction on admission.

and myocardial infarction in Eastern Europe and a high educational level and myocardial infarction in non-European countries[18]. In addition, the rates of myocardial infarction and stroke increase as countries develop[19,20]. In explaining our findings, different thresholds for seeking medical advice must also be taken into consideration.

In the group of patients with cigarette smoking as a risk factor, we could not demonstrate a significant age-related trend on outcome in comparison with other studies[21]. Early mortality from acute ischemic heart attacks in developing countries may be reduced by early admission to the coronary care unit[22]. In our cohort, a positive history of myocardial infarction was frequent (22.9%). Although we did not have a control population, it is hypothesized that most myocardial infarction patients have some risk factors and should be educated in secondary prevention to decrease the rate of reinfarction. Even though social status and gender affect physical capacity after myocardial infarction and psychological sequelae to heart attacks may disrupt attempts to changes in health habits, the post-infarction "discharge worksheet" containing information to educate patients and to stratify the risk factors and drug treatment on the basis of chart documentation is an effective secondary prevention measure for recurrent myocardial infarction and should be given to all patients prior to discharge[23-26].

Even in cardiological emergencies personal transport is often preferred over ambulance to get to the hospital[27]. In accordance with this, ambulance transportation in our study was very uncommon and with a disturbing male preponderance. This begs further consideration. The limitations of our study include the relatively small cohort of patients and a moderately long follow-up. We could have included more baseline data at inclusion such as the family history of ischemic heart disease, body mass index, and psychosocial status.

In conclusion, both the present and previous studies evaluating cardiac risk factors in Teheran and the Iranian countryside[28,29] have shown that the prevalence of coronary risk factors (e.g., cigarette smoking, diabetes mellitus, hypertension and dyslipidemia) is high. This, and unsuspected sex differences, warrant better information, treatment, primary and secondary prevention to decrease the rate of ischemic heart disease in Iran.

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References

1. Rackley CE, Schlant RC. Prevention of coronary artery disease. In: Schlant RC, Alexander RW, eds. The heart, arteries and veins. 8th edition. New York, NY: McGraw-Hill, 1994: 1205-12.
2. Murray CJ, Lopez AD. Alternative projections of mortality by cause 1990-2020. Global Burden of Disease Study. Lancet 1997; 349: 1498-504.
3. Murray CJ, Lopez AD. The global burden of disease. In: Murray CJ, Lopez AD, eds. The global burden of disease: a comprehensive assessment of mortality and disability from disease, injuries and risk factors in 1990 and projected to 2020. Boston, MA: Harvard School of Health, 1996: 1-52.
4. Oonpuu S, Negassa A, Yusuf S. Inter-heart: a global study of risk factors for acute myocardial infarction. Am Heart J 2001; 141: 711-21.

5. Cannon CP, Battler A, Brindis RG, et al. American College of Cardiology key data elements and definitions for measuring the clinical management and outcomes of patients with acute coronary syndromes. A report of the American College of Cardiology Task Force on Clinical Data Standards (Acute Coronary Syndromes Writing Committee). J Am Coll Cardiol 2001; 38: 2114-30.
6. Black HR, Barkis GL, Elliott WJ. Hypertension, pathophysiology, diagnosis and treatment. In: Fuster V, Alexander RW, O'Rourke RA, Roberts R, King SP 3rd, Wellens HJ, eds. Hurst's the heart. 10th edition. New York, NY: McGraw-Hill, 2001: 1554.
7. Alpert J, Thygesen K, Antman E, Bassand JP. Myocardial infarction redefined - A Consensus Document of the Joint European Society of Cardiology/American College of Cardiology Committee for the redefinition of myocardial infarction. J Am Coll Cardiol 2000; 36: 959-69.
8. Onat A, Senocak MS, Surdum-Avci G, Ornek E. Prevalence of coronary heart disease in Turkish adults. Int J Cardiol 1993; 39: 23-31.
9. Birchfield PC. Identifying women at risk for coronary artery disease. AAOHN J 2003; 51: 15-22.
10. Sekikawa A, Horiuchi BY, Edmundowicz D, et al. A "natural experiment" in cardiovascular epidemiology in the early 21st century. Heart 2003; 89: 255-7.
11. Campos H, Mata L, Siles X, Vives M, Ordovas JM, Schaefer EJ. Prevalence of cardiovascular risk factors in rural and urban Costa Rica. Circulation 1992; 85: 648-58.
12. Rutledge T, Reis SE, Olson M, et al. Socioeconomic status variables predict cardiovascular disease risk factors and prospective mortality risk among women with chest pain. The WISE Study. Behav Modif 2003; 27: 54-67.
13. Singh RB, Niaz MA, Ghosh S, et al. Epidemiological study of coronary artery disease and its risk factors in an elderly urban population of north India. J Am Coll Nutr 1995; 14: 628-34.
14. Janion M, Kurzawski J. Clinical course and long-term prognosis in patients with recurrent myocardial infarction. Pol Arch Med Wewn 2000; 103: 53-9.
15. Gottlieb S, Harpaz D, Shotan A, et al. Sex differences in management and outcome after acute myocardial infarction in the 1990s: a prospective observational community-based study. Israeli Thrombolytic Group. Circulation 2000; 102: 2484-90.
16. Limacher M, Handberg E. Evaluating women with chest pain for the diagnosis of coronary artery disease. Dis Mon 2002; 48: 647-58.
17. Pitsavos CE, Panagiotakos DB, Chrysohoou CA, Skoumas J, Stefanadis C, Toutouzas PK. Education and acute coronary syndromes: results from the CARDIO2000 epidemiological study. Bull World Health Organ 2002; 80: 371-7.
18. Chang CL, Shipley MJ, Marmot MG, Poulter NR, Can cardiovascular risk factors explain the association between education and cardiovascular disease in young women? J Clin Epidemiol 2002; 55: 749-55.
19. Chang CL, Marmot MG, Farley TM, Poulter NR. The influence of economic development on the association between education and the risk of acute myocardial infarction and stroke? J Clin Epidemiol 2002; 55: 741-7.
20. Singh RB, Mori H, Chen J, et al. Recommendations for the prevention of coronary artery disease in Asians: a scientific statement of the International College of Nutrition. J Cardiovasc Risk 1996; 3: 489-94.
21. Andrikopoulos GK, Richter DJ, Dilaveris PE, et al. In-hospital mortality of habitual cigarette smokers after acute myocardial infarction: the smoker's paradox in a country wide study. Eur Heart J 2001; 22: 776-84.
22. Martin TC, Van Longhuyzen HW, Amaraswamy R, Tangutoori R, Bennett B. Myocardial infarction in Antigua. 1990 to 1995. West Indian Med J 1997; 46: 76-9.
23. Kimble LP, McGuire DB, Dunbar SB, et al. Gender differences in pain characteristics of chronic stable angina and perceived physical limitation in patients with coronary artery disease. Pain 2003; 101: 45-53.
24. Samad Z, Rashid A, Khan MA, et al. Acute myocardial infarction: profile and management at a tertiary care hospital in Karachi. J Pak Med Assoc 2002; 52: 45-50.
25. Nori D, Johnson J, Kapke A, Lenk D, Borzak S, Hudson M. Use of discharge-worksheet enhances compliance with evidence-based myocardial infarction care. J Thromb Thrombolysis 2002; 14: 43-9.
26. Finnegan DL, Suler JR. Psychological factors associated with maintenance of improved health behaviors in post-coronary patients. J Psychol 1985; 119: 87-94.
27. Martiny W, Malfi D, Fava A, et al. A survey of cardiological emergencies in Piedmont. G Ital Cardiol 1992; 22: 127-40.
28. Hatmi ZN, Motlag A, Firozian A, Bigvand A, Malek A. Study the prevalence of coronary artery disease risk factors in Tehran year 2000. (abstr) In: Abstracts of the XVI International Epidemiology Association World Congress. Montreal, 2002: MP30.
29. Sarraf-Zadegan N, Sayed-Tabatabaei FA, Bashardoost N, et al. The prevalence of coronary artery disease in an urban population in Isfahan, Iran. Acta Cardiol 1999; 54: 257-63.