CLINICAL ASPECTS

THE PREVALENCE AND EVOLUTION OF CARDIOVASCULAR RISK FACTORS: STUDY IN AN URBAN COMMUNITY IN A PERIOD OF 8 YEARS (1997-2005)

CRISTINA VLAD

Cardiology-Recovery Clinic, Cluj-Napoca

Abstract: Transversal study, screening and longitudinal type following a period of 8 years (1997-2005), in a representative study group of 137 men and women, residents of the "Zorilor" neighbourhood Cluj-Napoca, aged between 18 and 62. A questionnaire about cardiovascular risk behaviour, medical exam, EKG, and laboratory exams was applied (1997 and 2005). Evaluation of cardiovascular risk was based on the "SCORE" risk model. The prevalence and distribution of HTN, dyslipidemia, smoking, T2DM, obesity, MetS and resting HR were determined. There were 21,62% high risk subjects. The prevalence of HTN, hyper-TC, hyper-LDL-C, hyper-TG, hypo-HDL-C, MetS prevalence has increased significantly.(p<0,01). The prevalence of T2DM and obese subjects has insignificantly increased, (p=NS) The prevalence of smoking has decreased insignificant from 50,45% to 48,11%, (p=NS). In the studied batch, we can observe an increase in resting HR along with aging, a more significant increase in women, aged 40 to 49, (p=NS). Cardiovascular risk factors screening in the general population is required at the level of primary assistance for the state of health.
Keywords: cardiovascular risk factors, "SCORE" risk

Rezumat: Studiu transversal, tip screening şi longitudinal, urmărire în dinamică pe o perioadă de 8 ani, prin eşantion reprezentativ de 137 bărbaţi şi femei, rezidenţi ai cartierului "Zorilor"din Cluj-Napoca cu vîrste cuprinse între 18 si 62 ani. S-au efectuat: chestionar asupra comportamentelor de risc cardiovascular, examen medical, EKG, probe de laborator (1997 si 2005). Evaluarea riscului cardiovascular s-a bazat pe modelul "SCORE". S-au determinat prevalenţa şi distribuţia HTA, dislipidemiei, fumatului, DZ, obezităţii, SMet şi Fc. Au fost 21,62% subiecţi cu risc crescut. Prevalenţa HTA, hipercolesterolemia, hiperLDL-C, hiperTG-mia, hipoHDL-C, prevalenţa SMet au crescut semnificativ.(p<0,01) Numarul subiecţilor obezi şi diabetici nu s-a modificat semnificativ.(p=NS) Prevalenţa fumatului a scăzut de la 50,45% la 48,11%. (p=NS) La lotul studiat se constată o creştere a Fc de repaus cu înaintarea în virstă, creştere mai mare la femei, între 40-49 ani. (p=NS). Este necesar screeningul FRCV în populaţia generală la nivelul asistenţei primare a stării de sănătate.

Cuvinte cheie: factori de risc cardiovascular, risc "SCORE"

INTRODUCTION

Cardiovascular diseases (CVD) including coronary heart disease (CHD) and stroke are the main cause for premature death. It accounts for almost half of all deaths in Europe causing over 4.35 million deaths each year.(1) Even if the mortality rate is declining in most countries in Europe, the prevalence of CHD is increasing due to the improvement of the treatment, the increase in elderly population and the growth of life expectancy. In spite of all this, CVD can be prevented. The prevention of CVD is based on the concept of risk factors.(2)

MATERIAL AND METHOD

This study is transversal, screening and longitudinal, prospective, dynamic following, over a period of 8 years (1997-2005). Out of the target population represented by 21.453 adult subjects in the "Zorilor" neighbourhood age 18 to 62 a randomized study group for CVD risk factors was selected in 1997. For the reevaluation that was made in 2005, 106 subjects remained; 5 subjects deceased–3,64% (4 deaths out of cardiovascular causes, 1 death by gastric neoplasm), 26 subjects– 23,96% refused to participate or changed their address. There were 45 men (42,45%) and 61 women (57,54 %) with an average age of 49 ± 5 years. Like we mentioned before during the 8 years no specific directed measures were applied for primary cardiovascular prevention. All the participants were subjected to a complete clinical exam and the following risk factors were determined: hypertension (HTN), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), triglycerides (TG), type 2 diabetes mellitus (T2DM), body mass index (BMI), metabolic syndrome (MetS), smoking, resting heart rate (HR).

Cardiovascular risk assessment by SCORE System. The SCORE risk assessment system considers sex, age, TC, systolic blood pressure (SBP), and smoking. We used the table for populations at high CVD risk on the basis of total/HDL-C levels. It predicted the 10-year risk of fatal cardiovascular events. In the studied lot we calculated the cardiovascular risk using the SCORE risk

model, thus: low risk ≤ 1, moderate risk 2-4 %, high risk ≥ 5%. (3,4)

Hypertension (HTN) According to the ESH/ESC criteria, subjects with SBP >140 mm Hg and/or diastolic blood pressure (DBP) > 90 mm Hg, as well as those with previous history of HTN and taking current antihypertensive medication for control BP, were considered hypertensives. HTN was consider controlled when SBP was <140mmHg and DBP was <90mmHg under hypertension treatment.(5)

Dyslipidemia. Presence of dyslipidemia was defined by LDL-C ≥130 mg/dl, HDL-C <40 mg/dl, TC ≥200 mg/dl, or TG ≥150 mg/dl. Subjects were also included as prevalent cases if they were on lipid-lowering medication at the time of the baseline visit but had normal lipid levels. Treatment was defined as current use of lipid-lowering medication, such as hydroxymethylglutaryl-CoA reductase inhibitors, bile acid sequestrants, fibric acid derivatives, or niacin. Diet modification and other lifestyle changes were not considered as treatments in this analysis. Control of dyslipidemia was defined as the absence of abnormal lipid levels defined by ATP III in subjects on medication. (6)

Obesity was defined by two criteria: a. BMI, which is calculated using the formula: weight (in kilograms) divided by the square of height (in meters). Subjects with BMI 25-29 were considered overweight and subjects with a BMI of ≥ 30 were considered obese.; b. waist circumfere**nce** (WC) was defined according to the IDF 2005 guidelines : WC > 80 cm for women and WC> 94 cm for men. (7,8)

Type 2 diabetes mellitus (T2DM). Subjects with fasting glucose ≥ 126 mg/dl were considered hyperglycemics and those with history of T2DM and using oral glucose – lowering medication were considered diabetics. (9,10)

Metabolic syndrome (SMet) was defined by the following criteria**:** elevated WC plus at least two of the following four elements: elevated TG, equal to or greater than 150 mg/dL or specific treatment for this type of dyslipidemia, reduced HDL-C: men - less than 40 mg/dL and women - less than 50 mg/dL or specific treatment for this type of dyslipidemia, elevated BP: equal to or greater than 130/85 mm Hg or treatment for HTN previously diagnosed, elevated fasting glucose: equal to or greater than 100 mg/dL .

Smoking. The smoker was considered the person that smokes at the moment of the start of the study, utilizing any tobacco product, either daily or occasionally. **Nonsmokers** are the people that don't smoke at all in the moment of the start of the study. (11)

Resting heart rate (HR) was on average between 60 and 80 beats per minute and can sometimes be over 100 beats per minute for out of shape, sedentary persons. (12)

<div style="text-align:center">**RESULTS**</div>

"SCORE" risk model. There were 76 (68,47%) subject with low risk, 7 (6,30%) subject with moderate risk and 24 (21,62%) subject with high risk. Subjects

previously diagnosed with CHD - 4 (3,60%) were excluded. Subject with T2DM, TC ≥ 320 mg, LDL-C ≥ 240 mg, BP ≥ 180/110 mmHg were included with high risk. Repartition by sex of the subjects with high risk shows a significant prevalence for the male sex (36,73% vs. 10,34%). Repartition by age groups shows an increase along with aging (40-49 years –20%, ≥ 50 years – 68,18%).

Hypertension (table 1) In the studied lot the prevalence of HTN increased from 34 (30,63%) in 1997 to 63 (59,43%) in 2005.(p<0,01) A growing evolution of the average SBP and DBP was noted both for men and women – statistically significant over the 8 years. (p<0,01) In the year 1997, the prevalence of stage I HTN was 12,61% and the prevalence of stage II HTN was 9,01%.. The situation remains the same in the year 2005 so: 26,42% had stage I and 23,52% stage II. In 1997 the number of newly diagnosed subjects with HTN (incidence) was 12,61% and in 2005 the number of new cases has significantly increased to 27,36%..(p<0,01) In 1997, among all hypertensive subjects, only a third was undergoing antihypertensive medications (32%). In 2005 among all hypertensive subjects, 71% were undergoing antihypertensive medications (p<0,01) Defining controlled HTN as the percentage of cases with BP <140/90mmHg we observe that among all hypertensive subjects - the control rate has increased from 0 % (1997) to 8% (2005). If controlled HTN is reported only to those taking medication, the control rate has grown from 0% to 11% .

Table no. 1. The prevalence, treatment and control of hypertension

Year of study	1997	2005	
Age groups			
≤ 39 years	35,14%	11,71%	
40-49 years	42,37%	37,84%	
≥ 50 years	18,02%	33,33%	
HTN prevalence	30,63%	59,43%	p< 0,01
women	19,35%	49,18%	p< 0,01
men	44,90%	73,33%	p< 0,01
SBP average mmHg	135,1	147	p< 0,02
women	130,2	142,4	p< 0,02
men	140,0	151,6	p< 0,04
DBP average mmHg	81,3	90,5	p< 0,01
women	77,7	56,0	p< 0,01
men	87	94	p< 0,01
HTN newly discovered	12,61%	27,36%	p< 0,01
HTN awareness	59,46%	67,92%	p= NS
HTN treatment	32%	71%	p< 0,01
HTN control (out of the total hypertensive subjects)	0%	7,9%	p= NS
HTN control (out of the treated hypertensive subjects)	0%	11%	p= NS

Dyslipidemia (table 2) The prevalence of dyslipidemia having the only modification the growth of TC shows a statistically significant increase from 36,94% to 62,26%.(p< 0,01) average value of cholesterol has grown from 192,52 mg/dl to 217,80 mg/dl. The

prevalence of dyslipidemia having the only modification the growth of LDL-C was significantly larger in 2005. (50,94% vs. 16,22%). The average value of LDL-C has increased from 98,57 mg/dl to 133,42 mg/dl. The prevalence of dyslipidemia having the only modification the growth of TG was statistically significant: 21,62% in 1997 and 40,51% in 2005. (p<0,01) The average value of TG has increased from 132 to 168 mg/dl. The prevalence of dyslipidemia having the only modification the decrease of HDL-C < 40% has also been statistically significant.(from 12,61%-1997 to 28,30%-2005).(p<0,01) The average value of HDL-C has decreased from 72,55 to 52,96 mg/dl.. In the year 1997 the number of newly discovered dyslipidemia cases was 17,12%, and in 2005 the number of subjects has grown to 34,90%, (p<0,01)

Table no. 2. The prevalence and evolution of CVD risk factors in 1997 and 2005

Year of study	1997	2005	
Hyper-TC	36,94%	62,26%	p< 0,01
High LDL-C	16,22%	50,94%	p< 0,01
Hyper-TG	21,62%	40,51%	p< 0,01
Low HDL-C	12,61%	28,30%	p< 0,01
Obesity according to BMI	22,52%	24,53%	p= NS
Visceral obesity 80- women 94- men	58,06% 44,90%	65,57% 55,56%	p= NS p= NS
T2DM	1,8%	6,6%	p= NS
MetS - NCEP ATP III	18,02%	46,03%	p< 0,01
MetS - IDF 2005	12,61%	32,08%	p< 0,01
Smokers	50,45%	48,11%	p= NS
Average heart rate	74,3	76,5	p= NS

Obesity. In the studied lot the prevalence of overweight has practically remained unchanged (40,54% - 1997 and 40,47% –2005). The number of obese subjects has insignificantly increased from 22,52% to 24,53%.(p= NS) WC (80/94) also shows statistically insignificant growth: for women increases from 58,06% to 65,57%, and for men from 44,9% to 55,56%. (p= NS)

Type 2 diabetes mellitus. The prevalence of T2DM was 1,8% - 1997 and 6,6% -2005, and hyperglycemia a jeun has increased from 29,73% -1997, to 34,97% - 2005. (p =NS) Average values for glycaemia have grown from 96,48 mg/dl to 99,43 mg/dl.

Metabolic syndrome. Utilizing the IDF- 2005 criteria, the prevalence of SMet has also increased significantly from 12,61% to 32,08%.(p<0,01)

Smoking. The prevalence of smoking has decreased from 50,45% to 48,11%. (p=NS) Repartition by age groups shows an increased prevalence for smokers between 40 and 49. Repartition by sexes shows an increased prevalence for male smokers.

Resting heart rate (HR) Average HR has increased from 74,3 in 1997, to 76,5 in 2005. The analysis of simple linear regression for the HR values between 1997 and 2005 shows a positive correlation (r =0,52 ;p <0,01).

The results of the study show an increased prevalence of subjects with high risk (SCORE≥5) After 8 years we observe that all the 4 subjects (3 male and 1

female) with fatal cardiovascular events had high risk in 1997, which demonstrates a good correlation with the absolute fatal cardiovascular events prediction method - "SCORE" risk. HTN prevalence has registered high values, practically the number of hypertensive patients doubling during 8 years (from 30,63% to 59,43%). The increase is significant both for men and women (it is more significant for females as opposed to countries in Western Europe where the prevalence is higher for males). Evidently the prevalence grows along with ageing.(13) Possible explanations for this growth could be more accentuated psychosocial stress, changes in the diet, ageing. Average BP values are situated in the field of normal-high values in the studied lot which concurs with the average values of the adult population in Romania. (14) Newly diagnosed HTN in 2005 is larger than newly diagnosed in 1997 which demonstrates the fact that subject don't show up periodically for the control of their BP. Concerning the control rate, it has grown in 2005 but statistically insignificant. The low HTN control rate is characteristic for countries in Europe that have recorded percentages between 1 and 10% (in England, Germany, Finland, Spain, Italy control rate is between 5% and 8%). (15)

In the studied lot the prevalence of dyslipidemia has significantly increase starting with 1997. Although the modifications are significant for all the lipids fractions analyzed the growth was larger for TC, LDL-C followed by HDL-C and TG. Possible explanations of these growths are related to lifestyle changes. Nutrition has suffered significant changes after 1990, more accentuated in previous years along with the economic growth, leading to an increased intake of animal protein (statistically meat and fat consumption have progressively grown).(16) This fact is more evident for the urban population in the large cities. Also physical inactivity contributes to the growth of dyslipidemia. In our country the prevalence of dyslipidemia is 46% according to the SEPHAR study (2005) and 42% according to the CARDIO ZONE (2006) study placing us among the countries with high prevalence.(17,18,19)

In the studied lot overweight subjects are predominant (over 40%). During the 8 years the prevalence of obesity has increased insignificantly. In Romania the prevalence of overweight and obesity is growing. According to European statistics in Romania the prevalence of obesity in 2002 was 5% for men and 13% for women; and in 2005 it was between 10-14,5% for men and 20-24,5% for women (20). According to the SEPHAR study the prevalence of obesity in 2005 was 24% (12) Although the number of T2DM subject has tripled, the increase isn't statistically significant.. In Europe the prevalence of T2DM is increased and therapeutic control is decreasing. (18) MetS prevalence has significantly increased both for men and for women especially in the age group 40-49 which is the same as in other studies. Identification and treatment of patients suffering from SMet may be the main prevention for T2DM and CVD.(21)

An increased prevalence of smoking was observed both in 1997 and in 2005; there is a tendency to decrease smoking, without being statistically significant. Smoking increases the risk of coronary events and of sudden death. So, the MRFIT Study has shown that there is a gradual relationship between the number of cigarettes smoked and CHD related deaths. A cardiovascular risk was observed in the case of passive smoking too.(22)

The association between resting HR and cardiovascular events is present for all ages even in subject over 70, it seems to be independent of other risk factors for atherosclerotic disease and has a consistency similar to smoking.(12) In the studied lot we can observe an increase in resting HR along with aging, increase more significant for women, ages 40 to 49.

CONCLUSIONS

Cardiovascular risk at an individual level shows an increased prevalence of "high risk" subjects, which imposes community and individual intervention. HTN prevalence has significantly increased statistically both for men and for women. Although HTN control has slightly increased, it remains unacceptably low, in spite of utilizing antihypertensive medication. The treatment principles follow the current guidelines. 89% HTN subjects remain therapeutic targets. Prevalence of dyslipidemia has significantly increased for both sexes. The number of controlled and treated subjects is insignificant. Treatment does not follow the current guidelines. A growth tendency for T2DM, obesity and abdominal obesity exists, without being statistically significant. Prevalence of MetS has significantly increased both for men and women. There is a tendency to reduce smoking for both sexes without being statistically significant. Ambulatory primary, professional, comprehensive, multidisciplinary programs are required. CVD risk factors screening in the general population is required at the level of primary assistance for the state of health.

REFERENCES

1. British Heart Foundation. European Cardiovascular Disease Statistics 2000. London. British Heart Foundation.
2. Heart Health Charter. Carta Europeana a Sanatatii Cardiovasculare-www.heartcharter.eu
3. Graham I. The SCORE Project Long-Term Studies on cardiovascular epidemiology and prevention, Leuven, 8 aprilie 2005.
4. Grundy S. Pasternak R, Greenland P, Smith S, Fuster V. AHA/ACC Scientific Statement. Assessment of Cardiovascular Risk by Use of Multiple-Risk Factor Assessmentt Equations. Circulation 1999;100:1481-92.
5. Guidelines for the Management of Arterial Hypertension 2003. J of. Hypertension, 2003; 21:1011-53.
6. Expert panel on detection, evaluation and treatment of high blood cholesterol in adults. National Cholesterol Education Program (NCEP): third report of the expert panel on detection, evaluation and treatment of high blood cholesterol (Adult Treatment Panel III). JAMA 2001;285:2486-2497.
7. Hu G, Qiao Q, Tuomilehto J et al. Prevalence of the metabolic syndrome and its relation to all-cause and cardiovascular mortality in nondiabetic European men and women. Arch Intern Med 2004;164:1066-1076.
8. Rosenson R. New approaches in the intensive management of cardiovascular risk in the metabolic syndrome. Curr Probl Cardiol 2005;30:241-280.
9. The Implementation of the National Type 2 Diabetes. Prevention Programme in Finland: FIN-D2D, International Reporting Days, Tampere, Finland, June 4-7, 2006.
10. ESC and EASD Guidelines. Guidelines on diabetes, pre-diabetes, and cardiovascular diseases: full text. Eurheartj, 10;1093:1261.
11. The health benefits of smoking cessation. A report of the Surgeon General, 1990.Department of Health and Human Services.
12. Graham I, Agostino R. Managing Cardiovascular Risk, Atlad Medical Publishing Ltd. 2007, 81-101.
13. European Cardiovascular Disease Statistics. British Heart Foundation, 2000.
14. Cinteza M, Pana B, Cochino E, Florescu M, Margulescu A. Mædica- a Journal of Clinical Medicine; Prevalenta factorilor de risc cardiovasculari in studiul naţional Cardio-zone din Romania; vol. 2,4, 2007;278-88.
15. Wolf-Maier K, Cooper R, Banegas J, Giampaoli S, Hense H, Joffres M, Kastarinen M, Poulter N, Primatesta P, Rodríguez-Artalejo F, Stegmayr B, Thamm M. Tuomilehto J, Vanuzzo D, Vescio F. MFPHM Hypertension Prevalence and Blood Pressure Levels in 6 European Countries, Canada, and the United States JAMA. 2003;289:2363-2369.
16. Institutul National de Statistica. Recensamintul populatiei 2002. insse.ro.
17. Prevalenta, tratamentul si controlul HTA in Romania. Date din studiul SEPHAR. Med Int 2006,4, 9-18.
18. www.eurostats.org.
19. Cinteza M, Pana B, Cochino E, Florescu M, Margulescu A. Mædica, a Journal of Clinical Medicine; Prevalenta factorilor de risc cardiovasculari in studiul national Cardio-zone din Romania; vol. 2,4, 2007;278-88.
20. Hancu N. Cel de-al 32-lea Congres Nationalal Societatii Romane de Diabet, Boli de Nutritie si Boli Metabolice-Iasi Tratamentul oral si profilaxia diabetului, 2006.
21. Lakka HM et al. The metabolic syndrome and total and cardiovascular disease mortality in middle-aged men.JAMA 2002;288:2709-16.
22. www. Medfam.ro.