UNDERSTANDING RISK FACTORS AND PREVENTING CARDIOVASCULARY PATHOLOGY

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Abstract. Worldwide cardiovascular diseases are still the leading cause of death. Objectives: highlighting some cardiovascular risk factors and estimation of the cardiovascular risk for a lot of NIGG patients. Material and methods: The groups (study and control) consist of 60 and 33 subjects, respectively. Both are characterized by polypathology, but in the study lot, cardiovascular diseases are more numerous. The overall assessment was based on clinical data and medical-social tests for life style, physical functionality, nutritional status (BMI, MNA) and food preferences. Results: We enumerate some significant differences between the two groups regarding cardiovascular risk factors. In the study group we find • age factor-females over 65 years, and •family history of hypertension (un-modifiable determinants) which are higher than in the control group, with 22% and 19%, respectively. In the control group, modifiable determinants- the education level and the income, have weights higher with 10-12%, showing their favorable health effect. In the case of biological determinants, the percentages of risk factors are higher in the study group (e.g. hypertension and obesity, higher with 30 percents). But in the control group, the lifestyle determinants have more increased percents: there are three times more smokers and 5% of them consume more salty foods and more fats. The CV risk is estimated by the "Cardboard Risk Test" with four levels: very high, high, medium and low risk. In the study lot, the very high and high risks are each, more than 10 percent higher compared to their equivalents from the control group. Conclusions: the presence of CV risks fairly frequent in the control group highlights the need for active prevention measures among those considered "healthy".
Key words: prophylaxis, risk factor, lifestyle

CUNOAŞTEREA FACTORILOR DE RISC CARDIOVASCULAR ŞI PREVENŢIA PATOLOGIEI CARDIOVASCULARE

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Rezumat. În lume, bolile cardiovasculare (BCV) sunt prima cauză de deces. Obiective: evidenţierea unor factori de risc cardiovascular, pe un lot de pacienţi din INGG. Material şi metode: Subloturile (studiu şi control) sunt reprezentate de 60, respectiv 33 subiecţi. Ambele sunt caracterizate de polipatologie, dar în lotul de studiu, BCV sunt mai numeroase. Evaluarea globală s-a bazat pe date clinice şi teste medico-sociale pentru: stilul de viaţă, funcţionalitatea fizică, statusul nutriţional (BMI, MNA) şi preferinţele alimentare. Rezultate: Enumerăm câteva diferenţe semnificative între cele două subloturi, în privinţa factorilor de risc. În grupul de studiu găsim factorul •vârstă, la femeile peste 65 ani şi •istoricul familial de hipertensiune arterială (determinanţi nemodificabili), ambii având valori mai înalte decât în grupul de control, cu 22%, respectiv, 19%. În grupul de control, determinanţii modificabili: •nivelul educaţional şi •venitul, au ponderi mai mari cu 10-12%, sugerându-se efectul lor favorabil asupra sănătăţii. În cazul determinanţilor biologici, mărimile procentuale ale factorilor de risc sunt mai mari în grupul de studiu (e.g. hipertensiunea şi obezitatea, mai mari cu 30%). Dar în grupul de

control, determinanţii stilului de viaţă au ponderi mai înalte: există de trei ori mai mulţi •fumători şi 5% din grup consumă mai multă •sare şi mai multe •grăsimi. Riscul CV este estimat prin „Testul cartonaşelor", cu patru niveluri de risc: foarte înalt, înalt, mediu şi scăzut. În lotul de studiu, riscurile foarte înalt şi înalt, sunt fiecare cu 10 procente mai mari decât echivalenţele din lotul control. Concluzii: prezenţa riscurilor cardiovasculare, destul de frecvente în grupul de control, indică necesitatea unei prevenţii active, aplicată şi celor care se consideră „sănătoşi".

Cuvinte cheie: profilaxie, factor de risc, stil de viaţă

INTRODUCTION

In 2015, World Health Organization published a report which shows that cardiovascular disease (CVD) is still the leading cause of death in the world [1]. Over the past 30 years, there has been a significant decrease in CVD-related deaths in developed countries. More than half of the CV mortality decrease has been attributed to changes in risk factor levels in the population, primarily the reduction of cholesterol, blood pressure (BP) levels and smoking. This favourable trend is partly diminished by an increase in other risk factors, mainly obesity and type 2 diabetes. Aging of the population also increases CVD deaths [2].

In Europe, the high CV mortality rate is prevalent in the eastern countries, with a poor socio-economic situation. According to the latest American Heart Association statistics (2014), Romania ranks third in the world, after Ukraine and the Russian Federation, in terms of ischemic cardiopathy mortality and stroke [1]. And the World Bank's 2015 report shows that our country ranks 1st in Europe as mortality due to cardiovascular disease. (We have an average of 108.9 deaths per 100,000 inhabitants, compared with U.E.: 43.8 per 100,000 inhabitants). And in the mortality structure of our country, these diseases represent the first cause of death (57%) [3].

I. The concept of cardiovascular prophylaxis

In general, cardiovascular pathology, regardless of localization and etiopathogenic characteristics, is based on degenerative atherosclerotic changes. When talking about cardiovascular prophylaxis, the essential goal is to prevent or delay the onset of these lesions. Ideally, primary prophylaxis should prevent the development of cardiovascular disease. Starting from observational and interventional epidemiological studies, it was developed a unitary prophylactic concept on CV disease. The concept is based on the existence of determinant and favorable conditions in the occurrence of ischemic cardiopathy [4].

The risk is the likelihood that a person will be affected by certain pathology within a certain period of time. Individualization of the degree of risk is the first step of effective primary prophylaxis.

The risk factor is defined as the concept which includes •lifestyle elements, and also •physiological elements, •biochemical, and some •un-modifiable personal elements. These characteristics determine the significant increase in the frequency of a particular pathology. Typically, the same individual has several risk factors, each contributing to global risk.

The global risk is the result of the interaction of all risk factors but can be considerably higher than the sum of the effects of isolated risk factors. Currently, over 280 CV risk factors are known. Some are not directly involved in the pathogenesis of atherosclerosis, but cause specific lesions which subsequent are completed. For this reason, 6 risk factors (smoking, hypercholesterolemia, diabetes mellitus, age, gender, BP) were selected from all CV risk factors and they are known as major risk factors [4].

The absolute risk defines the likelihood of developing the condition (e.g. coronary ischemic disease - CID) over a certain period of time. Depending on the length of the period, the absolute risk can be: short-

term (maximum 10 years) or long-term (over 10 years).

Estimating cardiovascular risk requires a rapid assessment of the risk status in order to establish screening methods.

Quantification of cardiovascular risk consists in accurately assessing the risk status in order to establish therapeutic goals and assess the effectiveness of clinical management.

In 1994, the European Cardiology Society, the European Atherosclerosis Society and the European Society of Hypertension created the first European Guide, in order to outline CVD preventing means. Its purpose was to establish a consensus on the global risk assessment in the primary prevention of CID. The European Guide is revised every 4-5 years, the last publication being in 2016. Each meeting of expert societies brings new elements.

The 1998 version states that: "In CID, a multi-factorial etiology disease, it's important to •estimate the absolute risk for all healthy people, taking into account all risk factors".

The 2003 Guidelines extend the target of the prevention recommendations from coronary ischemic disease alone to all cardiovascular diseases. The Systematic Coronary Risk Assessment (SCORE) database is also modified for the CVD overall risk assessment. Also in 2003, • the concept of primary and secondary prevention is replaced by the recognition of an important fact: atherosclerosis is a continuous process, its onset being present even at younger ages.

In 2007, the new elements are:
• recommending to family doctors and cardiovascular nurses a greater involvement in CV prevention,
• emphasizing the importance of lifestyle counselling and
• reviewing CVD risk in young people [5].

The 2016 European Guidelines on CV prevention place greater emphasis on a population-based approach, on disease-specific interventions and on specific conditions of females, younger individuals and ethnic minorities.

In 2006, the European Heart Health Charter was launched, consisting in a public health statement supported by most EU member states. Among other recommendations, the Charter defines the profile of a healthy individual: "•non-smoker, •suitable physical activity- at least 30 minutes, five times a week, •healthy eating habits, •no overweight, •blood pressure below 140/90 mmHg, •serum cholesterol below 190 mg/dl, •normal glucose metabolism, •avoid excessive stress" [6].

Regarding prevention strategies, two distinct but complementary action approaches are delineated: the "population" strategy and the "high risk" individualized strategy - addressed to patients with known CVD or at high risk of developing CVD in the future [7]. Theoretically, most people could benefit through the high-risk strategy. But most of the deaths in a community come from the group of individuals with low levels of risk, because this group is more numerous than those of high-risk individuals. The latter, paradoxically, develop fewer events in absolute terms (the Rose paradox). For this reason, the strategy for high-risk individuals needs to be complemented by measures of the population strategy, i.e. measures to reduce risk factors and encourage a healthy lifestyle [1].

We need to know the importance of the specific risk factors to the population in our country, in order to control the alarming rise of cardiovascular disease. The objective is possible by conducting classical epidemiological studies to reflect the real profile of our population and a greater involvement of experts at national level.

SEPHAR studies (2005 and 2012) have shown a 40% prevalence of hypertension, 37% of obesity, 46% of dyslipidemia and 29% of smoking in the general adult population of Romania. Over 50% of newly diagnosed hypertensive did not

know their diagnosis at the time of screening, and of known hypertensive, only 39% were under treatment. The study highlighted an increased prevalence of cardiovascular risk factors in regions with low socio-economic levels. The cardiovascular risk estimated on the SCORE diagrams for the next 10 years was 3.5%, in the general population of Romania [1]. Another Romanian study is PREDATORR – The national study on the prevalence of diabetes, prediabetes, overweight, obesity, dyslipidemia, hyperuricemia and chronic kidney disease. Its results (published in 2014) show large figures of obesity (31.4%) and overweight (34, 6%) in line with the increase of type 2 diabetes, important risk factors for CVD [1].

II. Prevention through information, intervention and evaluation
1. Information
The guidelines of the European Cardiovascular Health Charter (2006) also regulate CV prophylaxis activities. Article 4 provides a classification of risk factors for informing the population and the medical world [6].
Risk factors associated with cardiovascular risk
A. General Determinants
• Unmodifiable: age, gender, genetic predisposition, ethnicity;
• Modifiable: income, education, living conditions, working conditions.
B. Biological determinants:
Hypertension, hyperglycemia, hyper-cholesterolaemia, overweight or obesity
C. Determinants of lifestyle
Smoking, unhealthy diet, alcohol abuse, physical inactivity

General Determinants: Unmodifiable risk factor "age"
In the USA, by the 1990s, the incidence of acute myocardial infarction in people under 45 was between 2% and 6%, of which 5-10% was women; after 1990 this incidence was between 4% and 10%. Also,

in the last years in Romania, a significant increase in the number of diagnosed CVD cases was found in the population younger than 40 years, including even myocardial infarction [3].
According to studies, the causes of early onset of CVD are primarily smoking and family history of CVD, these also being the most common risk factors for young people with myocardial infarction. Additionally, dyslipidemia, abdominal obesity, hypertension and diabetes (the latter two most common in the elderly) must also be considered.
WHO data places young Romanians in the top places in the EU with regard to smoking: 50% of young people aged 15-16 years have started to smoke. And of these children, 23% of them claim they smoked the first cigarette at 13 or even earlier [3].

General Determinants: Unmodifiable risk factor "gender"
Ten or fifteen years ago, ischemic heart disease usually was occurring in women ten years later than in men. This gap was due to the protective role of female hormones until the age of menopause.
The proportion of women victims of infarction before 50 years increased from 3.7% in 1995 to 11.2% in 2005 (WHO data). Professor Bertrand, a cardiologist at CHU Lille, former chair of the European Cardiology Society, says that "the combination of contraceptives with smoking increases the cardiovascular risk by 20 times." These two risk factors add to the effects of obesity and stress [8].
In conclusion, the two CV risk factors, age and gender, considered causative risk factors, are unmodifiable, but do not act isolated. They are associated with: smoking, obesity, dyslipidemia and stress. For the latter two, there is a multitude of prophylactic intervention measures.

2. Intervention
Article 3 from Heart Charter states: "In cardiovascular disease, which is multifactorially determined, it is essential

that all risk factors to be treated both individually and socially throughout the community." WHO stresses that cardiovascular disease treatment is often limited to addressing an isolated risk factor rather than cardiovascular risk as a whole. However, most infarctions and strokes can be prevented if the treatment is targeted at all cardiovascular risk factors.

Article 2: The Charter recommends lifestyle-oriented interventions for considerably reducing the number of cardiovascular diseases. WHO estimates that: reduction in • blood pressure, • obesity, • smoking and • cholesterol would decrease the incidence of cardiovascular disease to over half.

3. Cardiovascular risk assessment

The Romanian Heart Foundation launched in May 2011 the Campaign: "SOS Cardio - Attention, cardiovascular risk!" The Campaign aims to inform the population about cardiovascular risk factors, but also to assess individual risks before and after the therapeutic and lifestyle interventions [9]. "Cardboard Testing" is a tool recommended for assessing risk factors and cardiovascular risk. A simple and accessible tool, it consists of studying ten images, representing ten risk factors: age, heredity, male gender, smoking, high cholesterol, obesity, sedentary, stress, high blood pressure, diabetes. The computer test records the responses and then calculates the overall cardiovascular risk of the respondent. For people who do not have internet access, there is a green phone line: 0-800-070-777, where a healthcare provider offers information about risk factors and helps the person who calls to perform the test.

The test was also used in our cardiovascular risk assessment.

Objectives

- highlighting population-specific cardiovascular risk factors;

- estimation of the global cardiovascular risk of the subjects in the two groups: study and control.

MATERIAL AND METHOD

The study group, consist mostly in patients from NIGG, but also from the Medical Clinic of the Coltea Hospital. It has 60 subjects (17 men and 43 women) with increased percents of cardiovascular disease, especially coronary heart disease. The control group has 33 subjects (7 men and 26 women) with reduced percent of coronary ischemic disease. Chronic polypathology is still increased, with higher weights of rheumatism, digestive diseases and respiratory diseases.

The overall health assessment was based on clinical data, diagnostics and paraclinical data, but also on tests included in a medical-social survey that assess:

• Physical functionality- adl (Index Barthel), iadl Lawton and Brody,

• The lifestyle assessment (smoking, alchohol consumption, stress),

• Food preferences,

• Nutritional status (BMI, MNA) [10],

• Cardiovascular risk assessment Cardboard Testing, from the Champagne "SOS Cardio" of the Romanian Heart Foundation.

RESULTS AND DISCUSSIONS

I. The weights of the chronic diseases in the two lots

• There are percentage differences between chronic pathology from the two samples. So, in the study group some diseases are significantly more frequent compared to the control group, with the following percents: 25% - hypertension, 50% - coronary artery disease, 10% -diabetes melitus, 17.7%- obesity and with 10% - neurological diseases.

• Compared to the study group, in the control group, there are higher percentages for other conditions: rheumatic, digestive, respiratory diseases and also for neurotic syndromes.
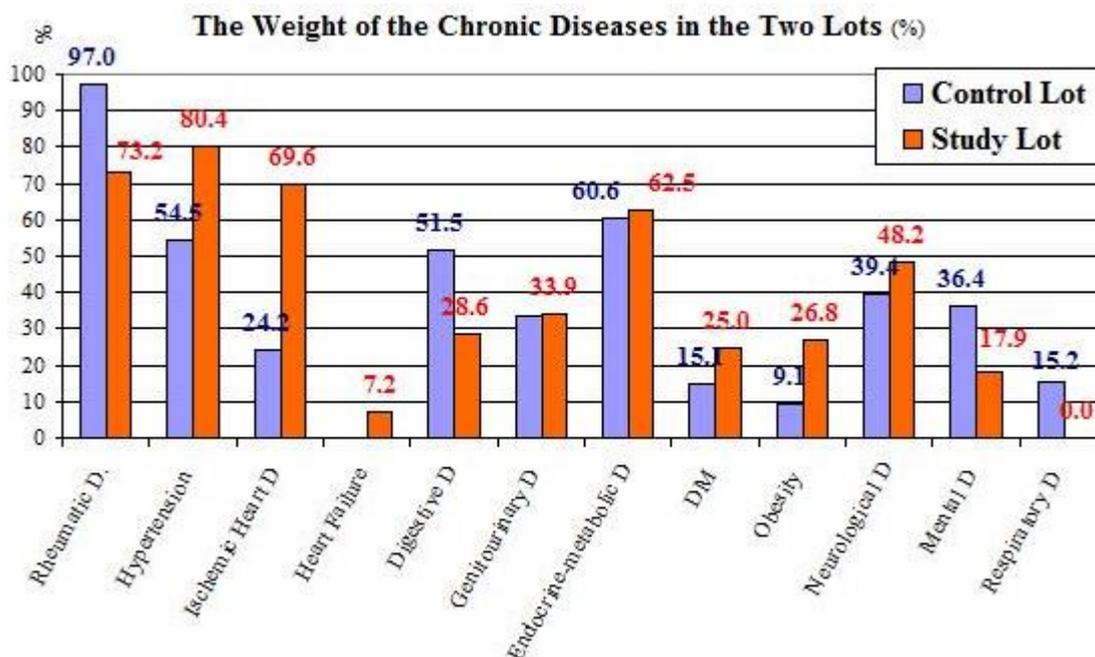
Fig.1The weights of chronic diseases in the study lot and the control lot (%)

II. Cardiovascular risk factors
The analysis data from our study emphasize cardiovascular risk factors. They are grouped after the classification indicated by the Cardiovascular Health Charter, as following:
(A1) General unmodifiable determinants

Tab. I Age and gender as risk factors

Study group (n=60)		Average age	**Control** group (n=33)		Average age
Males >55 years	= 90%	65.9 years	Males >55 years	100 %	68.9 years
Females >65 years	= 64.1%	68.5 years	Females >65 years	42.3%	63.5 years

Between genders, male gender is considered a risk factor. Also, as regarding the ages, males over 55 years old and females over 65 years are considered at risk of CVD.

Tab. II Heredo-collateral antecedents

Heredo-collateral antecedents of:	Study sample	Control sample
Hypertension	<u>70.2%</u>	51.5
Ischemic Heart Diseases	45.6%	**<u>48.5</u>**

Heredo-collateral antecedents are similar in severity for the control group as for the study group, as regarding coronary ischemic diseases. The proportion of antecedents of hypertension in the control group is less with a third as compared to the study group.
(A2) General modifiable determinants

Tab. III Education level in the two samples (%)

Education level	Study sample (%)	Control sample (%)
Primary courses (2-4 classes)	**17.7**	ns
Only gymnasium classes	**36**	36.4
Also high school	46.3	54.6

Tab.IV The income in the two samples (%)

The size of the income (pension mainly)	Study sample (%)	Control sample (%)
0 -349 lei	**10.9**	3,0 (ns)
350 – 999 lei	**56.4**	54,5
1000 – 4400 lei	32.7	42,4

Tab. III and IV, illustrating the education level and the income, show their favourable health effect: the control group, healthier regarding CVD, have the share of high school graduates by 8.3% higher than the study group; and those with larger pensions (1000-4400 lei) from the control group exceeds by 10% the share of those with similar income from the study sample.

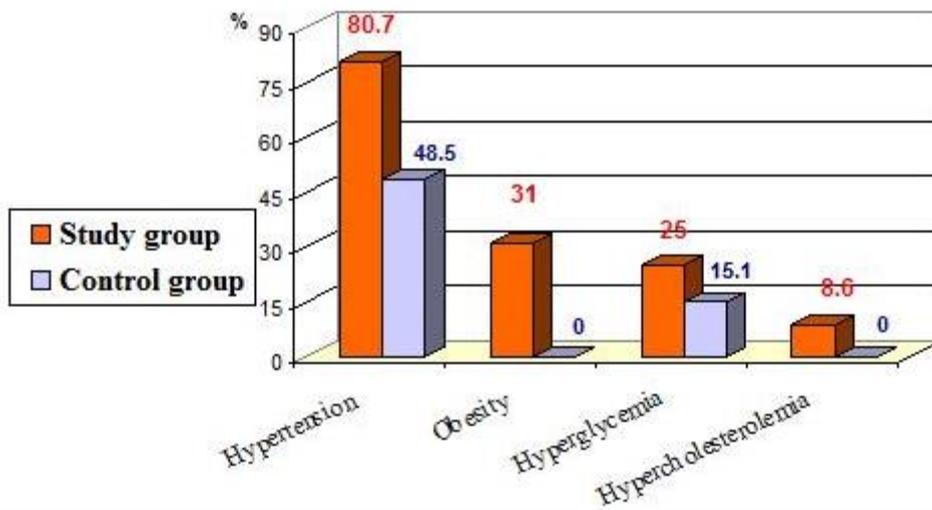B. Biological determinants

Fig. 2 Weights of biological determinants

The presence of CVD biological determinants is obviously higher in the study group than in the control group, with significant percentage differences: blood pressure occurs with 32.2% more frequent in the study group and hyperglycemia with 10 percentages higher. And obesity and hypercholesterolemia exist only in the study group.

C. Life style determinants

Tab. V Weights of unhealthy life habits (%)

Groups	Study Group	Control group
Smoking		
Smokers in the moment	8.6	21.2
Ex-smokers	17.2	12.1
Alcohol consumption		
Frequency: 4 or more times/week	8.8	9.1
Quantity: 2 or more units / day	12.3	ns
Unhealthy diets		
Excessively salty foods	31.5	36.4
Foods rich in cholesterol	36.1	39.4

By examining the figures from Tab. V, we can say that life style is just as damaging to health in both samples, or even more damaging, in the control sample. We can say this especially about smoking: in the control group there are almost 3 times more smokers than in the study sample. With regard to nutrition, 5% of the control group consumes more salty foods and 3.3% more fats, rich in cholesterol. Percentages of daily alcohol consumption are small, but almost equal in both groups. In fact, the situation described shows some compliance with the hygienic-dietary regimen prescribed to those with CVD:

they left smoking and consumed somewhat less fat and salt.

Tab. VI illustrates the frequency of physical activities in the two groups. Those in the study group are less active, probably due to CV disease. In general, few subjects do gymnastics, 30 minutes 5 times a week (as recommended). Such gymnastics is surely performed by those who have garden and work in it. (The difference between the control and study group is high: 25.5%). Also, housekeeping and cooking are substantially reduced due to CV disease between the two groups (by 27.8% and 21% respectively).

Tab. VI Weights of exercise and physical activity (%)

Groups	Study group	Control Group
Physical exercise (sanogenetic scope)	37.5	42.4
Gardening	32.1	57.6
Walking	37.5	33.3
Housekeeping	66.1	93.9
Shopping	67.9	81.8
Doing laundry	69.6	87.9
Cooking	69.6	90.9

When defining the healthy individual, the Heart Health Charter also includes: avoiding excessive stress. In our studied groups we mention only the percentages: a) for the good mental state - 12.5% (the study group) and 21.21% (the control group); and for the b) satisfactory condition- 14.7% in the study group and 45.45% for the control group. In other words, the proportion of those with good mental health has close values in the two lots, whereas the satisfactory condition is more than 3 times higher in the control group than in the study one. The rest of the

subjects, in both lots, have stress states of varying intensity (in the control group, percentages cannot be calculated due to the small number of people).

III. Assessment by calculation of cardiovascular risk

For the purpose of brief assessment individual CV risk assessment, the "Cardboard Risk Test" from the Campaign: "SOS Cardio" of the Romanian Heart Foundation was used.

▪ The 10 variables were mentioned in the study, separately in the two samples, for comparison.

Tab. VII The CV risk factors studied in our lots, also were included in "The Cardboard Testing"

General unmodifiable determinants	Biological determinants:	Life style determinants:
(1) age	(4) high cholesterol	(8) smoking
(2) male gender	(5) obesity	(9) sedentariness
(3) heredity	(6) blood hypertension	(10) stress
	(7) diabetes mellitus	

The test performs an estimation of the overall risk level. It allows for a repeated evaluation, before and after lifestyle changes and clinical and drug management. In our study lot, subjects go to the doctor preventively, not just for emergencies. The share of those concerned in prevention is higher in the study group (73.2%), compared to those in the control group (60.6%). In fact, among subjects with more severe heart disease (in the study group) this behaviour is the expression of compliance with recommended therapies. In other words, they are very worried about the severity of their health and respect a healthier lifestyle.
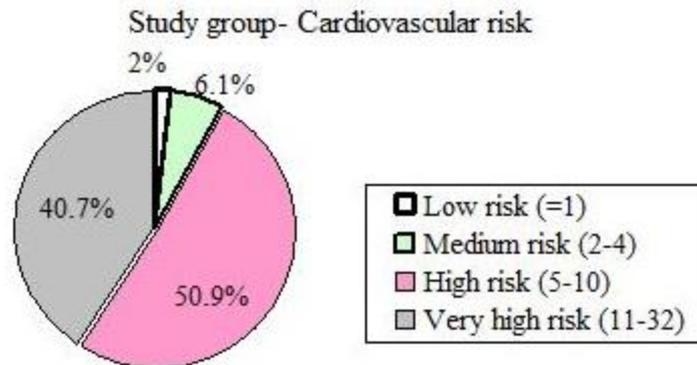

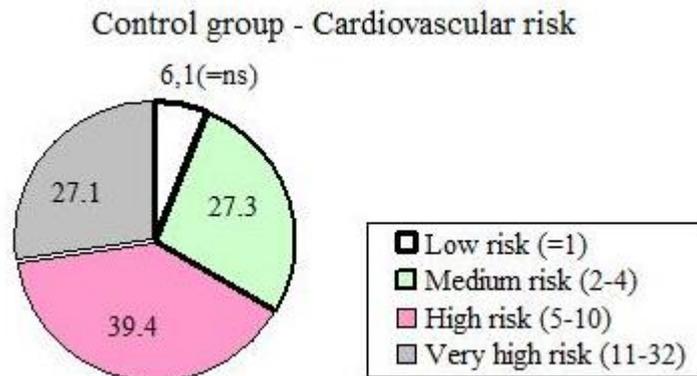Fig. 3 Cardiovascular Risk Assessment – Study group

Fig. 4 Cardiovascular Risk Assessment – Control group

Tab. VIII Comparison between the CV risks in the two groups:

CV risk	Scores	Study group (%)	Control group (%)
Low (1)	1	2	6.1(ns)
Medium (2-4)	2-4	6.1	27.3
High (5-10)	5-10	**<u>50.9</u>**	<u>39.4</u>
Very high	11-32	**<u>40.7</u>**	<u>27.1</u>

By comparing the two graphs, we observe a higher CV risk in the study group (high and very high risks gathered means 91.7% of subjects). On the other hand, in the control group there are lower weights for high CV risk (66.5%).

Also, we see in the study group small weights of low and medium risks (summed up = 8.1%) compared to the higher values for these risks gathered, in the control sample (33.4%).

CONCLUSIONS

The study reveals a large share of CV risk factors both in the study and in the control group. More specifically, in the case of biological determinants, the weight of these factors is higher in the study group; but in the control group, the lifestyle determinants have a higher weight compared to those from the study lot.

The results of the CV risk estimated according to the test scores indicate four levels: very high, high, medium and low risk. In the study lot, the very high and high risks are each more than 10 percent higher than their equivalents from the control group.

However, the presence of fairly frequent CV risks in the control group highlights the need for active prevention measures among those considered "healthy". Without such type of preventive interventions, these subjects will develop coronary heart disease in the years to come.

"The benefits of a successful cardiovascular prophylactic activity: •awareness of cardiovascular risk factors; •visiting a doctor not only in emergency situations, but also for preventive purposes; •manifestation of preventive behaviour at all ages; •effective CV risk control can extend life expectancy by at least 10 years; •applying preventive measures would have the greatest impact and the costs, both the financial ones and the cost of suffering, could be much lower in society" [9].

Conflicts of interest

The authors declare no conflicts of interest.

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