THE INFLUENCE OF PHYSICAL ACTIVITY AND DIET ON THE OCCURRENCE OF CARDIOVASCULAR DISEASES

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Abstract
The main objective of this study was to reduce the incidence of major cardiovascular diseases, by raising public awareness about the influence of cardiovascular risk factors. A questionnaire was distributed to a selected share of the population, in order to assess people's level of knowledge and their attitudes, at the same time evaluating the way diet, obesity, physical inactivity and sedentary lifestyles are perceived by the population as risk factors for cardiovascular diseases (World Health Report, 2002). The questionnaire revealed that 45.2% of patients did not perform any form of physical activity, 30% of them presenting strong or major risk to be affected by cardiovascular diseases. 220 subjects accepted advice on healthy eating and began to adopt a correct diet, so the share of people who initially presented strong or major risk was reduced by 16.0% and obesity was reduced by 14.8%. Physical activity reduced by 1.39 times the risk of cardiovascular diseases while a balanced diet reduced the risk of cardiovascular disease by 1.29 times.

Key words: physical activity, diet, cardiovascular diseases

INTRODUCTION

A number of factors are associated with the emergence of cardiovascular diseases - among the environmental circumstances one may consider: diet, obesity, physical inactivity, and sedentary lifestyles.

Currently overfeeding represents the main risk factor associated with the environment. Numerous studies (Murray CJL, et al,1996, O'Brien E, et al, 1997) confirmed that diets are rich in fat, sugars and complex hidrocarbonates: as they result in excess calorie intake, they favor atherosclerosis and the diseases interrelated to it. Obesity increases mortality, mainly by increasing cardiovascular mortality. It is estimated that a 10% increase in body weight increases the risk of coronary heart disease by 13% in men and by 8% in women (European Society of Hypertension, 2003, Rasalingam R, et al, 2002). Obesity is directly correlated with other cardiovascular risk factors, on which it has a negative influence: overfeeding, physical inactivity and certain metabolic disorders. Numerous epidemiological studies have shown that hypertension is more common in obese individuals, especially if obesity affects predominantly the upper trunk (Dorobanţu M, et al, 2006, European guidelines on cardiovascular disease prevention in clinical practice, 2003). It was shown that a reduction of obesity through an appropriate diet is accompanied by a net reduction in blood pressure.

Physical inactivity and sedentary lifestyles appear as a consequence of the lack of movement and exercise, characterizing the modern man, in the present conditions of technical progress. Numerous epidemiological studies (Grundy SM, et al, 2005), investigating possible causes of ischemic heart disease, have shown that men who whose professions determine them to be physically active are less exposed than their counterparts, engaged in sedentary occupations or professions that require merely easy exercise. The longer a person is sedentary, the higher the risk of sudden death by atherosclerosis. Exercise plays an important role in maintaining normal blood pressure and reducing blood pressure in people with mild or moderate hypertension (Cinteză M, et al, 2007, Ionescu Targovişte C, et al, 2006). The lipid profile is also modified by regular exercise, lowering the total cholesterol, LDL-C and triglycerides, and increasing HDL-C levels and apo A-1.

AIM

Decreasing the incidence of the main cardiovascular diseases by raising the population's awareness with regards to the importance of physical activity and diet as a risk factor in the appearance of cardiovascular diseases.

MATERIAL AND METHODS

Initially, a number of 3250 persons, registered on the lists of 10 general practitioners from Oradea municipality, have been monitored.
These patients have been selected in terms of the following criteria:
- They should have been over 18, - Patients in final stages of chronic, degenerative illnesses have been excluded
The clinical-static evaluation of the above-mentioned group of patients lasted for 4 years (from April 2005 to March 2009). Throughout the assessment period, a number of 874 patients did not return for the objective examination and the final questionnaire, which aimed to evaluate the patients' attitude with regards to the cardiovascular risk factors; consequently, only 2376 persons have been observed and evaluated.

RESULTS AND DISCUSSION

1.The distribution among the group of patients
     - in terms of gender
From the number of 2376 subjects chosen for this evaluation, the largest percentage (53,9%) is made up of women - 1280 persons, and only 41,6%, respectively 1096 persons, represent the number of male patients. By comparison with the general population, where the men/women ratio is

of 1:1, the ratio in the case of the evaluated group is 4:5. From the statistical point of view, no significant differences appear in comparison with the general population of Oradea municipality (p>0,05).

- **in terms of age**

The age group	Total		Women		Men	
	No.	%	No.	%	No.	%
18-34 years	366	15,4	225	17,6	141	12,9
35-49 years	589	24,8	310	24,2	279	25,5
50-64 years	947	39,9	486	38,0	461	42,1
65 and over 65 years	474	19,9	259	20,2	215	19,6

The structuring of the population in terms of age groups

The elderly persons form the most numerous group of people - about 60% of the subjects being over 50, while the group of people between 18-34 years old represents 15,4%, and the one between 35-49 years old represents 24,8%. The elderly persons are also predominant when focusing upon the general population of Oradea municipality, more than 55% of the population being included in this age group. No significant differences in relation with the distribution of the general population in terms of age groups has been observed (p>0,05).

In terms of gender and age groups, no significant differences have been observed in case of either men or women. When selecting the subjects for this study, the aim was to evaluate a rather equal number of men and women, although women demonstrated a livelier interest in the development of the research project.

- **in terms of education**

Educational level	Total		Women		Men	
	No.	%	No.	%	No.	%
Elementary studies	385	16,2	288	22,5	97	8,9
High-school education	1181	49,7	707	55,2	474	43,3
Post-high school (Vocational) education	506	21,3	193	15,1	313	28,6
Higher education	304	12,8	92	7,2	212	19,3

The distribution of subjects in terms of their education

Almost 50% of the subjects living in Oradea confirmed they completed their high school education (49,7%) and over 30% (34,1%) graduated from vocational or higher education institutions. It should be mentioned here that 51,1% of the 874 persons who have been eliminated from the study (447 subjects) finished only the elementary school.

2. Distribution of the group in relation to the type of work performed

The questionnaire aimed at evaluating of patients' level of awareness, as well as their attitudes, was meant to reveal the way in which diet is perceived as a risk factor for cardiovascular diseases. The resulted data have been related to the scale for the cumulative measuring of the risk

factor and a score has been obtained. In relation with these indices, the subjects have been grouped into five categories: presenting no risk factors, presenting minor risk factors, presenting moderate risk factors, presenting high risk factors and presenting major risk factors (see Table 3).

The distribution of subjects in terms of different risk factors has been achieved by means of two types of examinations, both during the initial and the final parts of the study. The first type of examination was represented by anamnesis and the objective examination of each patient in particular, while the second type of examination was associated with the questionnaire aimed at the evaluation of patients' awareness with regards to risk factors, as well as the evaluation of their attitudes; consequently the risk of incidence was obtained, in terms of the existence or the absence of risk factors.

2. Distribution of the group in relation to the type of work performed

Table 3

Type of activity	Total		Women		Men	
	No.	%	No.	%	No.	%
Initial evaluation						
Physical activity	1302	54,8	597	46,6	705	64,3
Sedentary activity	1074	45,2	683	53,4	391	35,7
Final evaluation						
Physical activity	1476	62,1	698	54,5	778	71,0
Sedentary activity	900	37,9	582	45,5	318	29,0

Population structure by the type of work performed

Physical activity is predominant to 54.8% of the total number of people in the group, sedentary activity having been detected in 45.2% of the persons evaluated for the purposes of our study, and the differences were not statistically significant between men and women in terms of type of activity ($p > 0,05$). At final evaluation, it was observed that 174 persons with sedentary activity at the beginning of the study began to make physical exercise. Given the fact that the 174 people represent over 16% of those with sedentary activity, we might conclude that education had a positive effect on their attitudes.

After the questionnaires were applied, the interviewed population was divided according to the score for the test as follows (Table IV):

Table 4

0		1		2		3		4	
0-2 points		3-4 points		5-6 points		7-8 points		9-11 points	
Without risk factor		Minor risk		Moderate risk		Strong risk		Major risk	
No.	%	No.	%	No.	%	No.	%	No.	%
Initial evaluation									
187	7,9	493	20,8	894	37,6	478	20,1	324	9,9
Final evaluation									
242	9,3	671	28,2	790	33,3	402	16,9	271	11,4

Distribution of cases according to the score for physical activity

Analyzing the distribution according to the score for physical activity, it may be observed that 30% of respondents present strong or major risk for cardiovascular diseases. The final evaluation indicated that the high risk of cardiovascular disease was reduced to 129 subjects, although the number who started physical activity was higher.

Although at the objective examination 45.2% of the patients admitted they did not perform physical activity, only 30% of them presented strong/major risk for the occurrence of cardiovascular diseases. After the participants at the study received basic information about health education for cardiovascular diseases, 16% of those with sedentary activity at the beginning of the study began to make physical activity, the high risk of cardiovascular disease having consequently been reduced to 129 subjects.

3. The distribution of the group in relation to weight status

Obesity is a major risk factor in the occurrence of cardiovascular diseases, being responsible for increased general mortality, mainly by negatively influencing cardiovascular mortality. Various studies have estimated that an increase by 10% increase in body weight increases by 13%, the risk of coronary heart disease in men and by 8% in women (71). Often, when obesity is present, it is associated with other cardiovascular risk factors such as: hypertension, hypertriglyceridemia, hypercholesterolemia. Given the data presented above, the study paid particular attention to identifying the degree of obesity distribution in the population studied.

Table 5

Weigh status	Total		Women		Men	
	No.	%	No.	%	No.	%
Initial evaluation						
Normal weight	701	29,5	295	23.05	406	37.04
Overweight	342	14,4	178	13.91	164	14.96
Degree I obesity	617	26,0	332	25.94	285	26.00
Degree II obesity	429	18,1	320	25.00	109	9.95
Obesity gr.III	287	12,1	155	12.11	132	12.04
Final evaluation						
Normal weight	753	31,69	362	28,28	391	35,67
Overweight	487	20,49	251	19,60	236	21,53
Degree I obesity	490	20,62	229	17,89	261	23,81
Degree II obesity	394	16,58	312	24,37	82	7,48
Obesity gr.III	252	10,60	126	9,84	126	11,49

Distribution of cases in relation to the degree of obesity

Weight excess was recorded at 70.5% of the population of which 26% is degree I obesity, 18.1% is degree II obesity, and 12.1% is degree III obesity (assessed by body mass index - BMI).

By comparing the data obtained with the information in the existing literature, it appears that they are comparable in terms of distribution of obesity in people with a surplus of 10-20 kg.

At final assessment there was a decrease in weight at about 10% of the patients studied.

Obesity is frequently associated with inappropriate diet and reduced physical activity. The correlation of these variables may increase cardiovascular risk in obese people, so that weight reduction should be recommended specifically to people with risk factors.

Given the issues raised in the questionnaires distributed to the population, which were aimed at the assessment of patients' knowledge level and attitude, we studied how nutrition could be a risk factor for cardiovascular diseases.

Table 6

0		1		2		3		4	
0-3 points		4-7 points		8-10 points		11-14 points		14-17 points	
Without risk factor		Minor risk factor		Moderate risk factor		Strong risk factor		Major risk factor	
Nr.	%	Nr.	%	Nr.	%	Nr.	%	Nr.	%
Initial evaluation									
191	8,0	223	9,4	575	24,2	903	38,0	475	20,0
Final evaluation									
223	9,4	224	9,4	771	32,4	789	33,2	369	15,5

Distribution of cases according to the score for diet

As diets in the western part of our country is generally high in fat, the evaluation score for diet shows that almost 60% of subjects didn't have an adequate diet. It should be remarked that if somatometric measurements showed a reduction in the number of 197 obese, the diet questionnaire shows that 220 subjects considered healthy eating advice and began to adopt a correct diet, so the share of people who initially presented strong or major risk was reduced by 16.0%, while obesity was only reduced by 14.8%. We can conclude that weight loss is not always the result of a healthy diet, recommended by a specialist in nutrition and metabolic diseases, many people deciding to reduce drastically the number of meals and the quantity of food ingested.

Correlating the data obtained from the objective examination and the questionnaires applied, it appears that obesity presents a strong/major risk factor in the occurrence of cardiovascular diseases, all obese patients, regardless of degree of obesity (56.2%) being included in the group presenting strong or major risk (58%).

4. The influence of physical activity and diet upon the occurence of cardiovascular diseases

In order to quantify the intensity of risk factors in relation with the cardiovascular diseases the subjects of this study suffered from, the relative and the attributable risks have been determined.

The relative risk indicates how many times higher is the risk to develop a disease for patients presenting risk factors than for patients who are not exposed to risks, measuring the force of the epidemiologic association.

The attributable risk indicates the excess of risk in the case of exposed persons, in other words the part of the risk that is due to the risk factor. The following results have been obtained at the end of our investigation:

Table 7

Risk factor (RF)	HTA		CI		IMA		Total	
	R_r	R_A	R_r	R_A	R_r	R_A	R_r	R_A
Type of activity Sendentary life Regular physical activity	1,31	0,07	1,52	0,05	1,52	0,02	1,39	0,12
Weight status Normal weight or overweight, degree I, II or III obesity	1,23	0,05	1,33	0,03	1,56	0,02	1,29	0,09

The relative and the attributable risk of risk factors for CVD

Obesity is a major risk factor for cardiovascular diseases, the risk of their occurrence being 1.3 times higher in the case of degree I, II or III obese person than in the case of normal weight and overweight persons. Even when physical activity was present, relative risk values higher than 1 were recorded, which indicate that that these may also lead to cardiovascular diseases. In arterial hypertension risk factors are physical inactivity and obesity (degree I, II or III). The main risk factors for coronary heart disease are obesity (RR = 1.52), followed by inactivity (RR = 1.33)

The health education of the population and the involvement of general practitioners in monitoring the above-mentioned risk factors might significantly reduce the incidence of cardiovascular diseases.

CONCLUSIONS

Although at the objective examination 45.2% of patients admitted they did not perform physical activity, only 30% of them presented strong/major risk of cardiovascular diseases. After the study participants received basic information about health education related to cardiovascular diseases, 16% of those with sedentary activity at the beginning of the study began to make physical activity, the high risk of cardiovascular disease having been reduced in 129 subjects.

Even if somatometric measurements showed a reduction in the number of obese by 197 persons, the questionnaire referring to diet showed that 220 took into consideration the healthy eating advice they received and began to follow a correct diet, so the share of persons who initially presented major or strong risk decreased by 16.0%, while obesity was only

reduced by 14.8%. We can say that weight loss is not always the result of a healthy diet, recommended by a specialist in nutrition and metabolic diseases, many people choosing instead to drastically reduce the number of meals and the quantity of food ingested.

Physical activity is a good means of preventing cardiovascular diseases, reducing their risk by 1.39 times, while a balanced - both quantitatively and qualitatively- diet reduces the risk of cardiovascular disease by 1.29 times.

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