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ARE REVASCULARIZED CORONARY PATIENTS PREPARED TO INCREASE THEIR PHYSICAL ACTIVITY LEVEL ?

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ABSTRACT. *Objective:* Assessment of coronary patients' availability to increase their physical activity level, after myocardial revascularization procedure. Materials and methods: Evaluating the daily physical activity level and the availability to participate in a structured exercise program after revascularization procedure (PCI+CABG) according to gender, revascularization method and compliance to cardiac rehabilitation program (CRP). Results: 16 months after myocardial revascularization and initiation of secondary prevention measures, 62% of patients continued to be sedentary and 54% had no intention to adhere at a structured exercise program in order to increase their physical fitness and quality of life. Only one third of them performed moderate or intense weekly physical activity. CABG patients were more inclined to participate in exercise training program than PTCA patients ($p<0.05$). The percentage of patients included in cardiac rehabilitation program that remained sedentary was significantly lower than in non-participants ($p<0.05$). Coronary patients that adhered to the cardiac rehabilitation program performed a significantly higher number of weekly METS and were more compliant to a structured exercise training program than non-participants ($p<0.05$). Conclusions: 16 months after myocardial revascularization and initiation of secondary prevention measures, most patients continued to be sedentary and had no intention to adhere to a structure exercise training program. The patients included in cardiac rehabilitation program were more inclined to perform intense or moderate daily physical activity than patients who did not benefit from this program ($p<0.05$).

Keywords: myocardial revascularization, level of physical activity, cardiac rehabilitation program

INTRODUCTION

Myocardial revascularization has become a common modality for treating patients with coronary heart disease. Revascularization procedures (PCI/CABG) insure the saving of ischemic myocardium but do not influence the risk and the evolution of atherosclerotic process (ACC/AHA, 2004).

It is widely recognized the role of physical activity in reducing cardiovascular risk in revascularized coronary patients. After myocardial revascularization, coronary patients tend to reduce their physical activity level due to the excessive precaution of not inducing the characteristic symptoms of disease. The protective attitude of family can contribute to the adoption of a sedentary lifestyle (Vanhees, 2007). Clinical data demonstrated that even a moderate physical activity level may decrease the cardiovascular mortality and morbidity and also can reduce the incidence of major adverse coronary events (Thompson, 2001).

Our main objective was to evaluate the revascularized coronary patients' perception concerning the frequency and intensity of their daily physical activity after hospital discharge and their availability to participate in a structured exercise training program dependent on sex, revascularization method and their compliance to cardiac rehabilitation program (CRP).

MATERIALS AND METHODS

We identified retrospectively from diagnosis registers and discharge lists of Timisoara Cardiovascular Diseases Institute a number of 463 revascularized patients (coronary artery by-pass grafting/percutaneous transluminal coronary angioplasty with placement of endovascular prosthesis). The identification was initiated no earlier than 6 months and no later than 3 years from the interview moment. The subjects were divided into subgroups according to gender, method of revascularization and their compliance to CRP.

We used the questionnaire method in order to quantify the daily physical activity level outside work (way to or from work, sport activities, gardening and other physical activities performed in their spare time) and their availability to participate in sustained physical training program. We quantified the physical activity level using the following stratification: without physical activity, mild physical activity (only light physical activity in most weeks), moderate physical activity (vigorous physical activity at least 20 minutes once or twice a week), intense physical activity (vigorous physical activity at least 20 minutes three or more times a week). We defined the structured exercise training thus: any planned physical activity (e.g. fast walking, aerobics, jogging, cycling, swimming, etc.), performed in order to increase the physical fitness; this work should be done 3-5 times a week in sessions of 20-60 minutes; in order to be effective, the effort must not be physically exhausting, but it should be done at a

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certain level resulting in increased breathing and sweating. We estimated the intensity and frequency of weekly physical activity using the formula: weekly METS = (frequency of strenuous exercise x 9) + (frequency of moderate exercise x 5) + (frequency of mild exercise x 3).

Statistics: variables were expressed as mean + standard deviation; percentage was calculated; using t test and $\chi 2$ test for parametric, respectively categorical variables subgroup comparison was validated; $p<0.05$ was considered statistically significant. Statistical analysis was performed using the Epi Info 6 (version 6.04 d) program.

RESULTS AND DISCUSSIONS

The main baseline characteristics of examined group were: PTCA patients predominated (69.3%), most of the subjects were males (74.3%) and medium age in the entire group was 61+9.68 years.

At interview moment, after about a year and a half from myocardial revascularization and initiation of secondary prevention measures, we assessed by using the questionnaire method the coronary patients perception (n=463) regarding their physical activity level. Most patients (62%) continued to be sedentary, while 25% respectively 13% performed moderate or intense physical activity more times per week.

No statistical significant differences were observed between PTCA versus CABG subgroup regarding their perception on physical activity intensity performed outside work and hospital ($p>0.05$). The majority of patients (56% of CABG patients and 54% of PTCA patients) developed only mild physical activity in most weeks and only a small proportion of patients (25% of surgical revascularized patients and 26% of interventional revascularized patients, respectively 12% of CABG subgroup and 13% of PTCA subgroup) performed intense respectively moderate weekly physical activity. Women were more inclined to develop light physical activity in most weeks (66%) than men (51%, p=0.002), whereas, as we expected, men developed more vigorous physical activity (16%) than women (4%, p=0.001) - table 1.

Table 1

Physical activity level outside work according to gender and revascularization method

Physical activity stratification	CABG n=142	PTCA n=321	p	Males n=344	Females n=119	p
No physical activity weekly	10	23	0,9	23	10	0,5
Only light physical activity in most weeks	80	173	0,6	174	79	**0,002**
Vigorous physical activity at least 20 minutes once or twice a week	35	83	0,7	93	25	0,1
Vigorous physical activity at least 20 minutes three or more times a week	17	42	0,7	54	5	**0,001**

All patients enrolled in CRP have been performing weekly physical activity since myocardial revascularization. Its distribution according to the intensity and frequency was as follows: a smaller number of coronary patients included in CRP (46%) developed mild physical activity in most weeks than non-participants (57%, p=0.05), and as we expected, the proportions were reversed between the two subgroups, in the benefit of the lot who adhered to CRP, in terms of performing vigorous physical activity at least 20 minutes once or twice a week (28% versus 25%, p=0.04), respectively three or more times per week (26% versus 10%, p=0.00002). The results are detailed in figure 1.

Comparing the weekly METS according gender and revascularized method, we noticed that men were more inclined to develop strenuous physical activity than women (39.96+23.70 METS/week versus 28.71+17.16 METS/week - p=0.00001), with no statistically significant differences ($p>0.05$) between surgical revascularized patients (35.32+19.05 METS/week) and interventional revascularized patients (37.84+24.16 METS/week).

Similarly, we observed that coronary patients included in CRP performed a significantly higher number of weekly METS (51.22+15.49 METS/week) than those who either refused to be enrolled in the program, either they did not receive any recommendation of attending this program (33.75+22.89 METS/week) - p=0.00001, as seen in figure 2.

At interview moment, after nearly one year and a half from myocardial revascularization and initiation of secondary prevention measures, we used the questionnaire method in order to assess the coronary patient perception regarding the regular exercise program, as have been defined in materials and methods. 31% of coronary patients attended to regular training after revascularization procedure (25% have been training more than 6 month and 6% less 6 months), 15% planned to start a regular physical training program (5% in the next 30 days and 10% in the next 6 months), while about half of patients (51%) did not intend to adhere to any regular physical training program. Coronary patients' availability to participate in a regular physical training, according to gender and revascularization method is presented in table 2.

Studia Universitatis "Vasile Goldiş", Seria Ştiinţele Vieţii
Vol. 20, issue 2, 2010, pp. 21-25

All patients included in a comprehensive rehabilitation program (n=88) attended in a structured physical training program (85% have been training for more than 6 months and 15% for less than 6 months) despite revascularized coronary patients that were not enrolled in this program (11% have been training for more than 6 months and 4% for less 6 months) - p=0.00001. The results are detailed in figure 3.

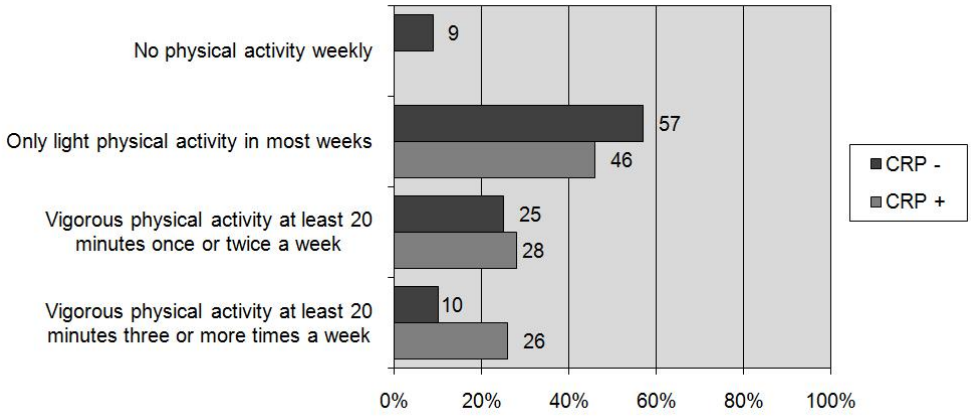

Fig. 1 Physical activity perception according to CRP compliance

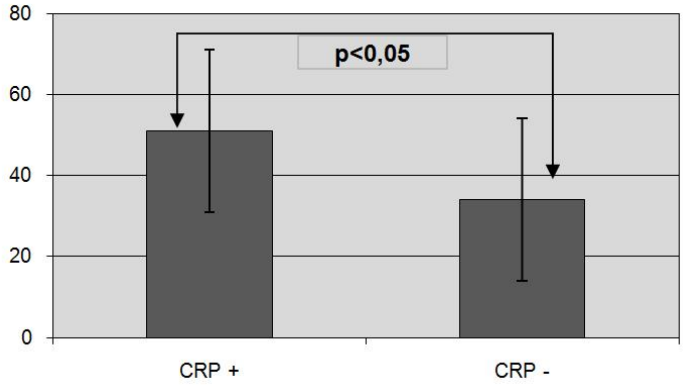

Fig. 2 Weekly METS according to gender and revascularization method

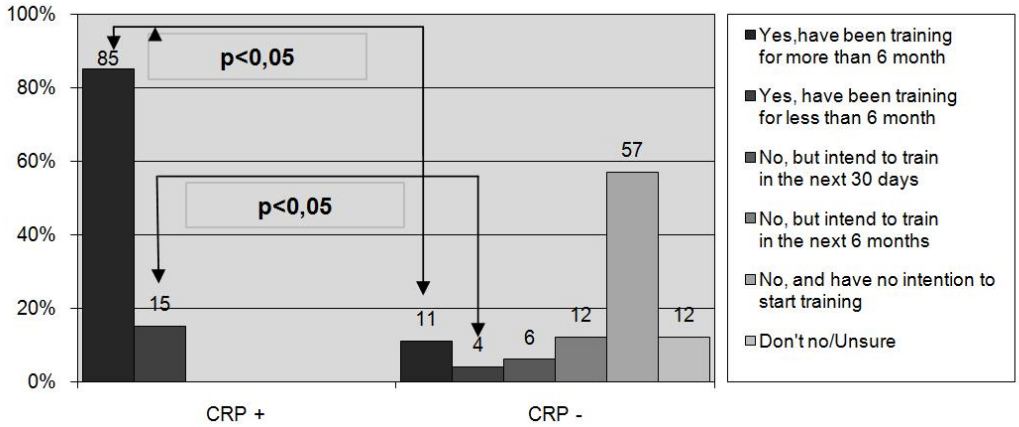

Fig. 3 The availability to participate in a regular physical training according to CRP compliance

Considering the modern concept, regular physical training is recommended for all revascularized coronary patients, not only for increasing their physical fitness, but also to slow the progression or induce the regression of atherosclerotic disease and improve compliance to secondary prevention measures (Taylor R et al, 2004).

In this context, we used a questionnaire method in order to estimate the physical activity level in analyzed subjects. Of the 463 revascularized coronary patients

included in the study, only 25% of them performed moderate physical activity once or twice a week and only 13% have intense weekly physical activity. 31% of coronary patients attended in a structured exercise training program after myocardial revascularization.

According to EuroAspire III results, a survey conducted in 22 European countries on 13935 coronary patients, only 16.4% coronary patients reported that they performed moderate or intense daily physical activity and only 33.8% adhered to a regular exercise program in order to increase their physical fitness and improve quality of life (Kotseva K et al, 2009).

Prospective epidemiological studies have shown that adopting a sedentary lifestyle increases the cardiovascular risk and also increase twice the risk of premature death (Folsom A et al, 1997).

In this study, 63% of revascularized coronary patients continued to be sedentary and 54% of them had no intention to increase their daily physical activity.

A meta-analysis regarding the role of physical activity in coronary heart disease demonstrated that decreasing the cardiovascular mortality by 35% was the primary benefit of coronary patients' adherence to a structured exercise program (Jolliffe JA et al, 2003).

In Romania, as in most European countries, only a small number of revascularized coronary patients are included in a complex cardiac rehabilitation program that associates supervised physical training (Vanhees L. et al, 2007). A significantly higher number of patients who were included in a comprehensive rehabilitation program presented an intense weekly physical activity (51.22+15.49 METS/week) and an increased availability for regular physical training versus non-participants in this program (100% versus 15%, $p < 0.001$).

Similar clinical data reveals a significant increase in physical activity intensity performed by surgical revascularized coronary patients included in a comprehensive CRP, versus those who perform home-based physical training and versus control group (without any recommendation to increase physical activity) (Pasquali et al, 2002).

Many of the physical activity benefits regarding secondary prevention for coronary heart disease (influencing the lipid profile, the insulin sensitivity or blood pressure) have an acute effect, that is maintained only briefly after cessation of physical activity, so that "daily effort dose" becomes a therapeutic necessity (Eric Peterson, 2003).

Table 2

The availability to participate in a regular physical training, according to gender and revascularization method

	CABG n=142	PTCA n=321	p	Males n=344	Females n=119	p
Yes, have been training for more than 6 months	53	62	**0,00003**	90	25	0,2
Yes, have been training for less than 6 months	9	17	0,6	19	7	0,8
No, but intend to train in the next 30 days	8	13	0,4	19	2	0,08
No, but intend to train in the next 6 months	14	32	0,9	36	10	0,5
No, and have no intention to start training	49	163	**0,001**	152	60	0,5
Don't know/Unsure	9	34	0,1	28	15	0,1

CONCLUSIONS

In about one year and a half from myocardial revascularization and initiation of secondary prevention measures, most of revascularized coronary patients continued to be sedentary and did not intend to adhere to a regular physical training program in order to increase their physical fitness and quality of life. Only one third of revascularized coronary patients performed moderate or intense weekly physical activity. The patients included in cardiac rehabilitation program were more incline to perform intense or moderate daily physical activity and to participate in a structured exercise program than patients who did not benefit from this program.

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