

## QUALITY OF LIFE AFTER CARDIOVASCULAR REHABILITATION IN CHRONIC ISCHEMIC HEART DISEASE

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### Abstract

The aim of the study was to compare the influence of a 12-week combined training on the subjectively perceived quality of life and on objectively measured indicators of performance (expressed as maximal achieved performance and performance converted to 1 kg of body mass) and on the capacity of the transport system (expressed as maximal oxygen intake and maximal oxygen intake converted to 1 kg of body mass) in patients with ischemic heart disease determined coronarographically with regard to their gender.

A 12-week combined training in men with ischemic heart disease resulted in increase of their performance and capacity of the transport system. They attained a lower heart rate at rest and at the same time increased values of maximal systolic pressure at the higher performance achieved.

As a result of the 12-week combined training male patients had fewer anginous difficulties in performing normal daily activities and did not have to take nitroglycerin because of these difficulties as frequently as before the training. The men included into the training were also evidently more satisfied with the course and quality of therapy after the training. The most important improvement, however, was achieved, as assumed, in subjective perception of the quality of life.

In women with ischemic heart disease the 12-week combined training led to increased capacity of the transport system; neither performance nor the other monitored parameters changed significantly, but occurrence of anginous difficulties in performing normal daily activities and the necessity of taking nitroglycerin decreased.

### Key words

Quality of life, Combined training, Chronic ischemic heart disease, Gender difference

### INTRODUCTION

Rehabilitation of cardiac patients plays a significant clinical and psychological role. It helps patients in the process of decondition and physiological changes appearing after acute myocardial infarction. Cardiovascular rehabilitation induces the feeling of security and helps the patient to return to normal life activities. Cardiovascular rehabilitation turns out to be important for a better physical performance and a feeling of health (1, 2). It leads to the increase of performance and capacity of

the transport system for oxygen and is also related to subjective perception of the quality of life.

The quality of life (QOL) reflects how a person takes his or her position in the world in the context of culture and value systems in which they live, and in relation to their aims, expectations, lifestyle, and interests (3).

Even if correlation between increased performance and improved quality of life can be expected, this relation is not obvious.

The function of the cardiovascular system in patients with heart arrhythmias being at risk of a sudden cardiac death improves in the case of pacemaker implantation. In some cases, however, excited patients can experience psychological disorders after pacemaker implantation that can be accompanied by anxiety and depressions.

In clinical practice we very often meet a discrepancy between the opinion of the doctor and that of the patient.

#### AIMS OF THE STUDY

The aim of the study was to compare the influence of a 12-week combined training on the subjectively perceived quality of life and on objectively measured indicators of performance (expressed as maximal achieved performance and performance converted to 1 kg of body mass) and on the capacity of the transport system (expressed as maximal oxygen intake and maximal oxygen intake converted to 1 kg of body mass) in patients with ischemic heart disease determined coronarographically with regard to their gender.

#### METHODOLOGY

The group of examined patients included 84 men ( $62 \pm 9$  years) with coronarographically determined ischemic heart disease (with mean ejection fraction EF  $48 \pm 10\%$ ) and 19 women ( $64 \pm 7$  years, mean EF  $46 \pm 8\%$ ), who participated in a 12-week rehabilitation program.

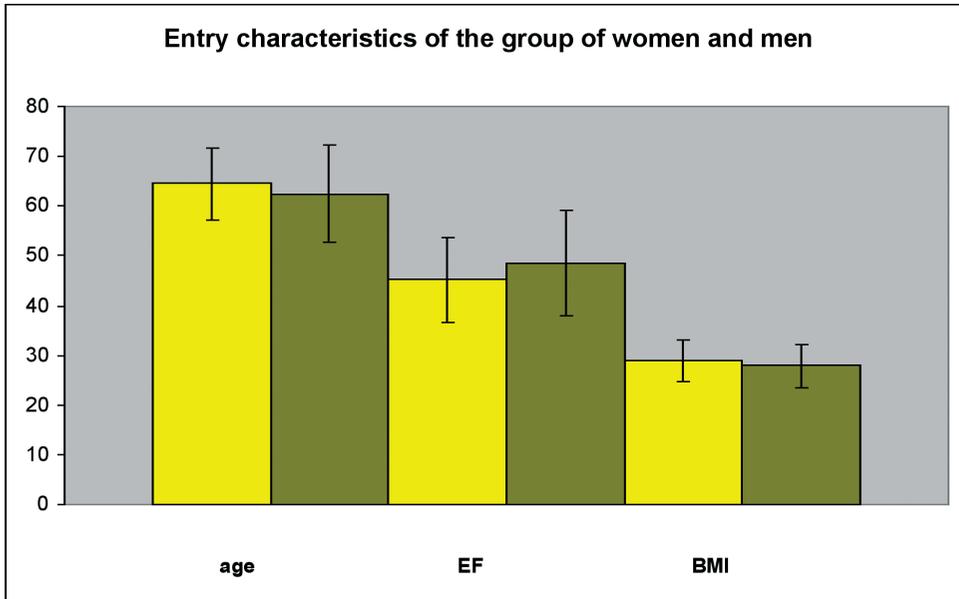
The patients included in cardiac rehabilitation had to comply with the following criteria: they did not suffer acute myocardial infarction or attack of unstable angina pectoris in the period of three months before the beginning of exercises, no patient had any heart valvular defect.

The patients with serious rhythm disorders, with symptoms of hemodynamic instability, with substantial marks of ischemia at rest or at load, were excluded. Also, patients with uncontrolled hypertension and other conditions and diseases making rehabilitation exercises impossible were not included into the group.

Before starting rehabilitation all patients were subjected to basic clinical examination and Doppler echocardiography by the instrument SONOS 5500 (Hewlett Packard).

Before the start and after the completion of the rehabilitation program a symptom-limited spiroergometric exercise test was made. A 12-lead electrocardiogram was recorded by the instrument Cardiovit CS 100 - Schiller. Ventilatory-respiratory values were determined by means of the gas analyser Pulmonary Function System 1 070 - MedGraphics CPX/D, USA, fitted with software for their analysis and evaluation.

The examination was made in the morning hours and the patients were advised beforehand to take the morning dose of their usual medication. The reason for the examination and its expected results were explained to all patients. Within the adaptation phase lasting 2 to 5 minutes in the sitting position on an ergometer for stabilisation of parameters the resting values of heart rate (HR) and blood pressure (BP) were read.



*Graph 1*

Basic characteristics of the group of patients

Legend: age (years), EF (%), BMI (body mass index), men are presented in green colour, women in yellow colour

The protocol with graded load without interruptions up to the symptom-limited maximum was determined for the examination. The patient kept the speed rate within the range of 50–55 per min. In the course of the examination HR was read from the ECG record each two minutes, the patient examined assessed the rating of perceived exertion (RPE), and his BP was measured by the auscultation method with a mercury manometer. Respiratory parameters in breath were determined by means of an analyser of breath gases in real time breath-by-breath. In addition to achieving the symptom-limited maximum generally valid criteria were used for finishing the test, the so-called end points (4, 5).

**Seattle Angina Questionnaire.** To find out subjective perception of the health state and affected quality of life, the patients were given a Seattle Angina Questionnaire (SAQ) to be filled out in the beginning of the rehabilitation program and after its termination. The questionnaire is divided into five parts (hereinafter and in the results referred to as SAQ 1–5) and contains nineteen items altogether.

**Part 1 (SAQ 1)** The patient indicates how chest pain or anginous pain restricted him during the last four weeks in performing the given activities. The activities are arranged according to physical severity.

**Part 2 (SAQ 2)** It deals with a comparison of the current health state with the period four weeks ago as to the frequency of occurrence of anginous difficulties in performing the usual daily activities.

**Part 3 (SAQ 3)** The patient indicates how many times a day or a week in the past month, in comparison with the same period four weeks ago, he had anginous difficulties and how many times he had to take nitroglycerin because of them.

**Part 4 (SAQ 4)** It refers to subjective perception of the therapy by the patient and his satisfaction with it.

**Part 5 (SAQ 5)** The last part should describe how the patients feel the quality of their life with the present illness and its potential fatal termination.

#### *Rehabilitation program*

The ambulatory controlled rehabilitation program (RHB) lasted 12 weeks at a frequency of three times a week. The training unit lasted 60 min and consisted of four phases (6, 7).

The warm-up phase was aimed at preparing the cardiovascular and locomotive systems for additional load, prevention of musculoskeletal lesion. It consisted of dynamic endurance exercises (simple floor exercises, exercises with gymnastic apparatus), and stretching of muscle groups tending to be shortened.

The aerobic phase took place on a bicycle ergometer (Ergoline REHA E900) controlled by the program ErgoSoft+ for Windows. The intensity of aerobic training was set at the aerobic threshold level.

The strength training was performed on multifunctional toning machines TK-HC COMPACT. Four exercises were done (bench press, pull-down, leg extension on the apparatus, and sitting-lying positions). The intensity of strength training was set by the 1-RM method and training loads were determined in per cent of the maximum: 30–60 % 1-RM (every week increasing by 10 %). The number of the series was 3 to 5 with ten repetitions. Before starting the strength training the patients were thoroughly informed about proper breathing and performance of exercises.

Relaxation phase: modified Schultz autogenic training was used.

Heart rate, blood pressure and RPE degree were monitored in the course of the whole training and during the aerobic phase; in the 1-RM test, ECG was also monitored.

The examination protocol of the study was accepted by the local ethical committee and all the patients signed their informed consent.

The results are given as average  $\pm$  standard deviations; for statistical evaluation the Wilcoxon test for paired values was used.

## RESULTS

After going through the rehabilitation program, the body mass and BMI were not changed either in men or in women, and also the initial systolic and diastolic pressure, maximal achieved diastolic pressure, maximal heart rate, and both resting and maximal product heart-rate pressure (product of systolic blood pressure and heart rate/100) were not statistically significantly changed in both cases.

In the group of men (before versus after) our results indicated a significant change of systolic blood pressure at maximum load ( $196.9 \pm 28.2$  mmHg v.  $203.4 \pm 27.1$  mmHg;  $p < 0.05$ ), heart rate (HR) initial ( $64.7 \pm 10.9$  cpm v.  $61.9 \pm 10.4$  cpm;  $p < 0.05$ ). An increase of performance did occur; however, it is statistically significant only in men (*Graphs 2, 3*).

Maximal muscle strength increased in the group of men:  $W_{\max SL}$   $113.35 \pm 33.14$  W v.  $123.0 \pm 35.6$  W;  $p < 0.01$ ;  $W_{\max SL} \cdot \text{kg}^{-1}$   $1.3 \pm 0.4$  W v.  $1.45 \pm 0.45$  W;  $p < 0.01$ .

The transport system for oxygen was improved at achieving the symptom-limited maximum ( $VO_{2SL}$ ):  $1691.6 \pm 411.8$  ml/min v.  $1833.8 \pm 45.2$  ml/min,  $p < 0.01$ ;  $VO_{2SL} \cdot \text{kg}^{-1}$   $19.9 \pm 4.8$  ml/min/kg v.  $21.6 \pm 5.7$  ml/min/kg,  $p < 0.01$ ; MET  $5.7 \pm 1.4$  v.  $6.2 \pm 1.7$ ,  $p < 0.01$ .

The quality of life measured by means of the questionnaire improved in the group of men after rehabilitation considerably in all aspects: SAQ1  $80.7 \pm 18.8$  v.  $84.9 \pm 15.8$ ,  $p < 0.01$ ; SAQ2  $79.6 \pm 21.6$  v.  $86.4 \pm 16.1$ ,  $p < 0.01$ ; SAQ3  $83.5 \pm 16.1$  v.  $88.5 \pm 14.4$ ,  $p < 0.01$ ; SAQ4  $88.4 \pm 16.1$  v.  $93.0 \pm 10.4$ ,  $p < 0.01$ ; SAQ5  $66.6 \pm 17.5$  v.  $73.6 \pm 17.6$ ,  $p < 0.01$ .

In the group of women we recorded a significant increase of the transport system capacity:  $VO_{2SL}$   $1134.8 \pm 155.4$  ml/min v.  $1215.0 \pm 184.6$  ml/min,  $p < 0.05$ ;  $VO_{2SL} \cdot kg^{-1}$   $15.1 \pm 2.4$  ml/min/kg v.  $16.3 \pm 2.4$  ml/min/kg,  $p < 0.05$ ; MET  $4.4 \pm 0.7$  v.  $4.70 \pm 0.67$ ,  $p < 0.05$ .

The questionnaire for the quality of life in women indicated increased quality of life in all aspects: SAQ1  $69.0 \pm 20.5$  v.  $75.7 \pm 16.2$ ,  $p < 0.01$ ; SAQ2  $78.00 \pm 18.2$  v.  $88.0 \pm 16.4$ ,  $p < 0.05$ ; SAQ3  $77.5 \pm 20.8$  v.  $84.2 \pm 17.1$ ,  $p < 0.01$ ; SAQ4  $89.9 \pm 12.7$  v.  $93.9 \pm 9.0$ ,  $p < 0.05$ ; SAQ5  $62.82 \pm 20.6$  v.  $72.15 \pm 17.27$ ,  $p < 0.01$ .

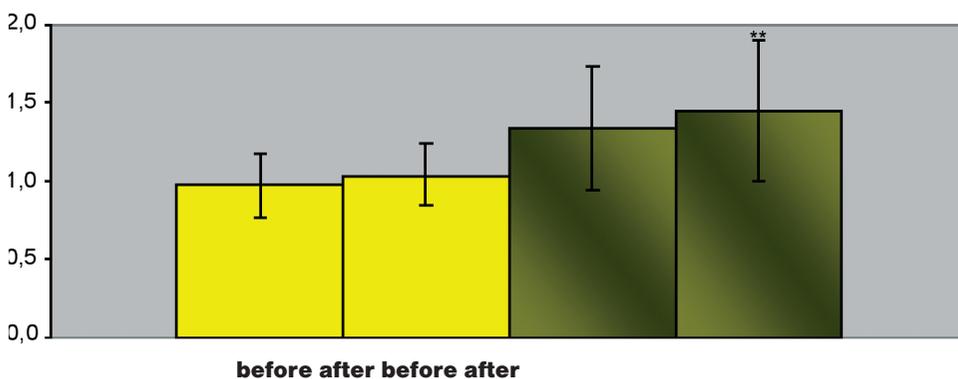
### W max (W)



Graph 2

Increase of maximal performance after cardiovascular rehabilitation in men

### W max/kg ( $W \cdot kg^{-1}$ )



Graph 3

Increase of maximal performance (to 1 kg of body mass) after cardiovascular rehabilitation in men

## DISCUSSION

The relation between the quality of life and the results of functional examination by load was studied in a number of papers (8,9,10). The definition of the quality of life given in the introduction to our study shows that the quality of life is influenced by the particular culture. That is why it is useful to study the relations separately in all cultural backgrounds. In our study we have proved a positive influence of cardiovascular rehabilitation on the quality of life in patients with chronic ischemic heart disease in men and women in the Czech Republic.

## CONCLUSION

A 12-week combined training in men with ischemic heart disease resulted in an increase of their performance and the capacity of the transport system. They attained a lower heart rate at rest and at the same time increased values of maximal systolic pressure at the higher performance achieved.

As a result of the 12-week combined training male patients had fewer anginous difficulties in performing normal daily activities and did not have to take nitroglycerin because of these difficulties. The men included into the training were also evidently more satisfied with the course and quality of therapy after the training. The most important improvement, however, was achieved, as assumed, in subjective perception of the quality of life.

In women with ischemic heart disease the 12-week combined training led to increased capacity of the transport system; neither performance nor the other monitored parameters changed significantly, but the occurrence of anginous difficulties in performing normal daily activities and the necessity of taking nitroglycerin decreased.

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