

## Summary

### **Theme: Effects of physical activity and diet in cardiac patients**

**Introduction:** Cardiovascular diseases are the most common cause of disability and death in Poland and worldwide. One of the most common is ischemic heart disease. Eliminating modifiable risk factors, primarily related to poor diet and insufficient physical activity, offers an opportunity to reduce morbidity and mortality due to these diseases, thus reducing medical expenditures in this sector.

**The aim of this study** was to evaluate the effects of physical activity and diet on motor skills and overall health status expressed by BMI, anthropometric measurements, blood glucose, and quality of life of cardiac patients with ischemic heart disease.

**Material and methods:** The patients were recruited from residents of the St. Padre Pio Regional Hospital in Przemyśl. The study was completed by 36 patients from study group I (rehabilitated), 29 patients from study group II (residing in the cardiac ward) and 66 healthy controls.

The following procedures were performed in all eligible patients before the start of the study and after completion after 4 weeks: history, Fullerton functional fitness test, 6-minute walk test, anthropometric measurements, body composition analysis, and standardized survey questionnaires. Venous blood draws were also performed in all patients and were repeated after 4 weeks. The blood level of fasting glucose were determined.

Workouts during rehabilitation camp were conducted 5 times a week in group I. The exercise programme for each individual consisted of: 10-minute warm up, 1-hour main exercises: resistance, stretching and endurance and 5-15-minute calm down phase. During exercise, the heart rate was monitored using sport-tester to perform exercises at heart rate individually selected for each patient.

**Results:** Cardiac patients examined prior to the start of the study demonstrated relatively low physical activity as well as nutritional abnormalities. As a result, 65.5% to 69.5% of them were overweight and their BMI indicated on overweight or obesity, depending on the examined group. The most common dietary errors included: too few meals per day, too little fruit, vegetables, dark bread and coarse cereals in the diet, and insufficient intake of vegetable oils. In the patient groups, the diet was characterized by a high intensity of "Non-Healthy Diet Index" (nHDI) (representing unhealthy eating habits) and low "Pro-Healthy Diet Index" (pHDI) (representing health-promoting properties of diet).

Participation in cardiac patient rehabilitation workout resulted in significant beneficial changes in the vast majority of the parameters studied. These changes concerned both body composition parameters and anthropometric parameters and indices. Highly significant changes were found after 4 weeks of rehabilitation in parameters related to fat accumulation: FAT ( $p < 0.003$ ), FM ( $p < 0.0000$ ), and FW ( $p = 0.014$ ). There was a reduction in the percentage of body fat, as well as total fat in kilograms and the percentage of visceral fat. This was confirmed by a reduction in skin fold thickness and body circumference.

However, a significant reduction in muscle tissue content was also observed. Regular physical activity during rehabilitation process led to a significant improvement in functional capacity parameters, as verified by the Fullerton test and the physical activity measured by the IPAQ questionnaire. A quality of life study also showed improvements in few areas verified by SF-36 questionnaire. Improvement in the overall health status was confirmed by the EQ-5D- 5L self-assessment questionnaire. It should be highlighted however that improvement in the overall health status occurred, although a large number of patients admitted to snacking during 4-week rehabilitation, maintaining dietary regimen. This shows, that patients are undisciplined and underestimate the impact of diet on their health, while at the same time emphasizes the importance of physical activity in improving overall health.

In general, women and men subgroups (GB I) responded similarly to the applied physical exercises and dietary modifications during the 4-week rehabilitation. Changes in the majority of the parameters examined were similar to the general group. Only in men was a significant reduction in the percentage of visceral fat (FW), total body water (TBW), FMI and MAFA parameters and the circumference of the right and left arms and thighs, waist and hips and also all skinfold thickness compared to women; although, muscle mass also reduced significantly. In women subgroup was a significant reduction only skinfold of abdominal, hips and thighs and fasting glucose.

In the group II, staying 4 weeks in the cardiac ward and not rehabilitated, there was only a significant increase FFMI. No significant changes in anthropometric parameters and indices were observed in subjects from GB II, as well as no improvement in motor skills with the Fullerton functional fitness test. Self-assessment of health status also did not improve as well as quality of life. In men subgroup was a significant reduction of FAT, FM, FMI, SMI, TBW, muscles weight and skinfolds of both arms.

The control group of healthy individuals had a lower baseline body weight than the patient groups and a generally normal BMI. Patients in this group scored better on the Fullerton functional fitness test than those who were cardiac problems. They had better blood test results

and high self-assessment of health status. After 4 weeks, the results of this group remained at a constant good level.

**Conclusions:** The training applied during the 4-week rehabilitation of patients had a beneficial effect on body composition, skin fold thickness, anthropometric parameters and indices, motor skills measured by the Fullerton test, and general physical activity measured by the IPAQ questionnaire, as well as on the selected parameters of the overall health status. In these patients, the self-assessment of health increased significantly according to the EQ-5D-5L. The quality of life examined by SF-36 questionnaire also improved. Therefore, it has been proved that in patients with cardiovascular disease, a 4-week rehabilitation workout was effective in improving motor skills and general health. Thus, cardiovascular patients should practice regular, moderate physical activity and follow a rational diet. In view of the observed patient reluctance to follow the proposed diet and their tendency to snack, it is important to inform them about how much their health depends on themselves and their self-discipline. Better education of cardiac patients on the principles of physical activity and proper nutrition is also recommended. In addition, the public should be better informed about the prevention and causes of cardiovascular diseases. The principles of a so-called healthy lifestyle should be taught to children at an early age in order to develop proper habits.