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# Possibilities of using Nordic walking training in cardiac rehabilitation

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## Abstract

Cardiac rehabilitation means that cardiac rehabilitation should be considered as multidirectional and comprehensive activities, considering human health in a holistic approach. Cardiac rehabilitation should be implemented as soon as possible, immediately after the end of life-threatening conditions in the course of coronary events or the direct effects of invasive treatment.

Many scientific studies indicate the effectiveness of Nordic Walking training in cardiac rehabilitation. It has the benefits of increasing exercise tolerance and oxygen uptake, and improves quality of life. Patients willingly choose this type of activity and tolerate it well, moreover, it is a generally available form of activity that can be practiced anytime and anywhere. This training can be recommended to a wide group of patients both as prevention and as a form of rehabilitation.

**Key words: Nordic walking; cardiac rehabilitation.**

**Stages of cardiac rehabilitation**

Cardiac rehabilitation has been described by the WHO as the sum of activities aimed at providing the patient with the heart in the best possible physical, mental and social conditions, so that they can return to normal family and professional life [14]. This means that cardiac rehabilitation should be considered as multidirectional and comprehensive activities, considering human health in a holistic approach. Cardiac rehabilitation should be implemented as soon as possible, immediately after the end of life-threatening conditions in the course of coronary events or the direct effects of invasive treatment.

Comprehensive cardiac rehabilitation includes a wide range of activities, including: assessment of the patient's condition, optimization of pharmacotherapy, physical training, psychosocial rehabilitation, diagnosis and combating risk factors for coronary artery disease, lifestyle modification, education of patients and their families [11].

One of the basic parts of comprehensive cardiac rehabilitation is physical rehabilitation. The perception of physical activity in patients with cardiovascular disease has changed dramatically over the past 30 years. Until the 1960s, immobilization or significant reduction in exercise was recommended for most patients with heart disease. Currently, trainings with moderate and often high loads are recommended in the prevention of coronary heart disease, and are also an important part of treatment after a heart attack, after percutaneous coronary angioplasty and cardiac surgery, as well as after implantation of the pacing system and after implantation of a cardioverter-defibrillator. Currently, also patients with heart failure, regardless of its etiology, benefit from cardiac rehabilitation [1, 12, 18].

Comprehensive cardiac rehabilitation is divided into 3 stages: the period of early rehabilitation (stage I and II) and the period of late rehabilitation (stage III).

**Stage I**

Stage I consists of hospital rehabilitation in the intensive care unit, postoperative unit, cardiology unit, internal medicine unit or cardiac rehabilitation unit. The main goal of this stage is to get it as fast as possible the patient's achievement of independence and self-sufficiency in everyday activities and counteracting the effects of immobilization. This stage continues until the patient is discharged home. Rehabilitation begins with relaxation and breathing exercises, and exercises in small and then large muscle groups. Over time, the patient is upright, walks and exercises climbing stairs under the supervision of a physiotherapist.

At the end of stage I, an exercise test is carried out on the patient in order to plan an individual rehabilitation plan for stage II (this does not apply to patients with absolute contraindications for exercise testing).

**Stage II**

The second stage of rehabilitation takes place in a hospital, outpatient clinic or home.

Rehabilitation carried out in a hospital takes place in stationary conditions in cardiac rehabilitation departments or in spa hospitals of cardiac rehabilitation. This type of rehabilitation is usually chosen for patients at high risk of cardiovascular complications, with serious comorbidities, in patients living in poor social conditions and in small remote locations.

On the other hand, outpatient rehabilitation is carried out by clinics or cardiac rehabilitation centers. This form of rehabilitation is recommended for younger patients, from large urban centers, with an uncomplicated course of the 1st stage of rehabilitation; it may also be a continuation of the stationary form - in patients whose early rehabilitation period turned out to be insufficient.

Home rehabilitation is supervised by cardiac rehabilitation clinics, cardiology clinics or by a family doctor trained in cardiac rehabilitation.

In stage II of cardiac rehabilitation, general rehabilitation exercises, endurance training and resistance exercises are used, with an intensity individually selected for the patient. The duration is 4-12 weeks.

**Stage III**

In stage III, rehabilitation is in polyclinic. The aim of rehabilitation is to improve exercise tolerance, maintain the current effects of treatment and rehabilitation, and reduce the risk of relapse.

It can be supervised by cardiac rehabilitation clinics, cardiology clinics or general practitioners trained in cardiac rehabilitation and should last a lifetime.

General development exercises are used. It is recommended, among others: marches, cycling, general fitness exercises, team games [11, 12, 8].

Endurance training is an important element of rehabilitation in stage II and III, and a march is the recommended form of training. Nordic walking fits perfectly into this nature of physical activity, and its constantly growing popularity makes this form of activity more and more often chosen as an alternative to walking by both physiotherapists and patients

themselves.

Tab. 1. Type of physical activity undertaken and duration of rehabilitation in particular stages of cardiac rehabilitation.

| | Stage I | Stage II | Stage III |
|---|---|---|---|
| Type of physical activity undertaken | - breathing exercises<br>- relaxation exercises<br>- active exercises<br>- upright standing<br>- walks | general fitness exercises<br>- resistance exercises<br>- endurance training | -a wide range of physical activity, including walking, cycling, gymnastics |
| Duration | until the patient is discharged home | 4-12 weeks | lifetime |

**Nordic walking**

Nordic walking is an intensively developing form of activity in the world. Its dynamic development took place mainly at the turn of the 20th and 21st centuries. Finnish skiers were the pioneers of Nordic walking, so since 1980 systematic scientific research on this form of classes has been conducted in Finland. It is a very universal type of activity, it is possible to achieve training goals on three levels: recreational (health), fitness and sports. The recreational level, otherwise known as the health level, is dedicated to a group of people with minor health problems. Thanks to the possibility of adjusting the individual rhythm of exercises, these people can safely walk with poles. With this form of training, it is possible to conduct rehabilitation, biological and mental renewal and convalescence. The fitness level includes exercising the whole body. With the help of this form of training, it is possible to increase physical fitness, burn fat, and increase oxygen absorption. The sports level, on the other hand, is dedicated to highly trained athletes, because its essence is to strengthen large muscle groups through techniques of mountain training, walking and running on various surfaces. This contributes to an increase in the body's efficiency and an increase in muscle mass. In cardiac rehabilitation, patients can practice Nordic walking at the recreational and fitness level, depending on their endurance, capabilities and recommendations.

Goals accomplished by Nordic walking training:

- healing, reduced to the treatment and improvement of the individual;

- anatomical and physiological, conducive to the improvement of human motor efficiency;
- educational and psychological, related to shaping positive character traits;
- hedonistic (pleasure), associated with obtaining a high level of satisfaction with physical activity, overcoming weaknesses and openness to taking up new tasks;
- social, influencing integration and cooperation with the environment of the individual
- utility (practical), reduced to maintaining efficiency and independence [3].

Nordic walking training brings many health benefits, including: improvement of cardiovascular fitness, strengthening of all muscles of the body, with particular emphasis on the muscles of the upper body, better burning of calories, joint relief and relaxation of muscle tension [13]. Thanks to the inclusion of Nordic walking poles in the march, the upper part of the body is activated, which makes this training a more effective form of recreation compared to regular walking. Nordic walking leads to increased work of the back and shoulder muscles, while supporting the work of the circulatory and respiratory systems [2].

However, in order for Nordic walking training to be safely and effectively introduced into cardiac rehabilitation, it must be carried out in accordance with the training standards defined by the Polish Society of Cardiology. The training should begin with a warm-up and end with a phase of calming down the body. The march with sticks should be performed 3 to 6 times a week with the intensity individually adjusted to the patient's capacity and the likelihood of complications. It can be implemented in the form of continuous or interval training, the choice depends on the patient's exercise capacity [5].

Nordic walking brings many health benefits to patients, especially important in cardiac rehabilitation. Moreover, it is a simple and safe form of exercise; relaxes, it can be used in any terrain, cultivated all year round. This training allows for the comprehensive development of the whole body and enables individual adjustment to the patient. Due to economic reasons it is a very cheap form of activity - apart from buying poles it costs nothing [13, 9].

The analysis of 10 most important basic life support systems of human body — cardiovascular (CVS), respiratory (RS), nervous (NS), digestive (DS), endocrine (ES), immune (IS), excretory (EXS), brain (BS), musculo-skeletal (MSS), hematopoietic (HS) was carried out. Based on this analysis two levels of ensuring the reliability of organism’s work were revealed: sequential and parallel.The system of logical equations for reduced sequential

system is: Ys1 = CVS RS BS, where is the notation for the conjunctions of set elements. The system of logical equations for the reduced parallel system is: Ys2 = NS DS ES IS HS EXS MSS, where is the disjunction of the scheme elements. Visualization of human STC changes the concept of the kinetics of age-related changes in the organism and the role of determinants of health as a stable factor accompanying a uniform, smooth transition from the most pronounced functions of the body to their gradual extinction. For human STC is formulated the following regularity kinetics of involutionary processes: after 30 years of age in the human body morphological changes regress in arithmetic progression, and the functions of organs in a geometric one. Assumption of health as a state redundancy of functions is suggested [16].

The research is devoted to the fundamental issue of medicine and biology – the study of factors limiting the life span of a person. As a model, the system of adaptation of the human body to the forces of natural gravity is chosen, the disadaptation to which manifests itself in falls and everyday injuries. The object of the study was the selection of severe fractures of bone tissue due to fall, taken in the age aspect. Statistical and meta-analytical research methods were used. It is shown that the age-related increase in mortality due to household falls, coming to severe bone fractures, is non-linear and increases in geometric progression. As a result of the coincidence of the age characteristics of bone fragility and age-related kidney function, an assumption is made about the role of involution of the renal tissue in the development of osteoporosis in the elderly and the need for a new approach to the prevention of osteoporosis and domestic injuries [17].

**Summary**

Many scientific studies indicate the effectiveness of Nordic Walking training in cardiac rehabilitation. It has the benefits of increasing exercise tolerance and oxygen uptake, and improves quality of life. Patients willingly choose this type of activity and tolerate it well, moreover, it is a generally available form of activity that can be practiced anytime and anywhere. This training can be recommended to a wide group of patients both as prevention and as a form of rehabilitation.

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