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APAS FUNCTIONAL TRAINING AND CARDIO FITNESS METHODOLOGY FOR PEOPLE WITH DISABILITIES

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FOREWORD

The methodology of the functional training and cardiorespiratory fitness of people with disabilities represents the material intended for professors of physical education and sport, coaches of people with disabilities, recreationists who work with people with disabilities, but also for all those who want to gain additional knowledge in this area. This document covers: the basics of functional training and its application in people with disabilities, functional and physical fitness with special emphasis on cardiorespiratory fitness, muscle strength and flexibility, as well as ways in which they can be developed through functional training in people with disabilities, the basics of designing such training for different forms of disability, equipment that can be used.

This content is intended for everyone who wants to contribute with their knowledge and practical work to make this world a better place to live. People with disabilities need support and help, and united we can create a better future for all. With the hope that the following lines will convey a good vibe to those who will read, I will just add: "Power is in implementation".

FUNCTIONAL TRAINING

Origin and definition: Functional training originated about 25 years ago from the need to improve sports performance, and can contribute to the general population, especially people whose daily functioning is hampered by some kind of disability (cerebral palsy, muscular dystrophy, multiple sclerosis, conditions due to spinal cord injuries - paraplegia and quadriplegia, amputations, visual impairment). Functional training trains a MOVEMENT, not a muscle. It is clear that in this way one could contribute to a better quality of life for people with disabilities.

Functional training can be defined as a movement or exercise whose basics are derived from natural movement. It is an efficient and simple exercise without any risk. In recent years, there has been a "return to the roots" trend that refers to a return to balanced exercise in which the focus is on general well-being and disease prevention. The goal of functional training is to "wake up" the body and add momentum to everyday life, which is achieved through: targeted movement of all body muscles and joints, targeted movements and activation of the spine, neurological, nervous and muscular system.

The functional training program relies on knowledge from sports medicine and physical therapy. Initially, it is exercised with the exerciser's own weight and the goal is to use body positions that are most appropriate for the needs of each individual exerciser with a disability. Since movements are practiced with this type of training, there is no emphasis on excessive strength development in a particular movement. In order to exercise a muscle in the way it is used in real movement, it is necessary to close the biomechanical chain. The key to developing this training is "not to go too far in any direction." A large number of exercises should be done in a standing position and be multi-joint, and at the same time key stabilizer muscles are developed in the hip joint, on the back of the shoulder and on the torso. For the needs of functional training, simple versions of squats, pulls, thrusts and pushes, throws and bends forward are used. It always starts with the exercises in stable positions and body weight, and then gradually controlled levels of instability are introduced (the exerciser must react to re-establish a stable position). The characteristics of functional training are: individuality, diversity and progressiveness.

The benefits of this type of training are great: it facilitates the performance of daily obligations and activities; increases muscle strength, endurance and speed; it improves flexibility and range of motion, strengthens the cardiorespiratory system, helps prevent injuries and rehabilitation, and improves posture.

Global principles of functional training:

1. Integral, not isolated - training of complex sequences of movements, which means that no individual muscle is isolated, but whole muscle chains are trained in the way they are used in everyday life.
2. Multidimensional volume - training everyday life movement patterns (daily routine, work, sports) that require the use of multiple joints in different planes.
3. Quality above (before) quantity.

4. Using stabilizer muscles - first of all take care of the stability of the torso.
5. Influence the correctable compensations and dysfunctions.

What functional training can do: The use of functional training is one of the most important steps towards general fitness and health. Training does not only affect the muscles, but also health and working ability. Endurance, properly dosed strength and flexibility are the foundation of performing any movement. The most relevant positive effects of individualized functional training are: increase of internal strength, endurance, improvement and optimization of basic stability and flexibility, improved body awareness and balance, increase of quality of life. Each of these impacts is invaluable, especially for people with disabilities. Functional training makes muscles, ligaments and joints healthier and more stable. The upper and lower body are usually exercised separately, especially the strength of the trunk muscles as a stabilizer. Exercises performed in several planes are much more complex and more accurately mimic the movements of everyday life. With the increase of fitness, i.e. ability of an exerciser, weights and additional resistances can be applied in functional training.

Exercises in functional training can be divided depending on which part of the body is trained into: exercises for the lower part of the body, exercises for the upper part of the body and exercises for torso stability. For each of the parts, different types of exercises can be applied: strength, endurance and flexibility.

BASICS OF DESIGNING A FUNCTIONAL TRAINING PROGRAM

For a properly designed functional training program, the following principles must be followed:

- First learn the basic patterns of movement. It is always necessary to first perfect the basic movement with your own weight before introducing any additional load.
- Start exercising with simple exercises with your own weight. With some exercises for strengthening the muscles of the upper part of the body, such as pulling (pull-ups, rowing) body weight can be a problem, so it is recommended to use help at the beginning of the exercise.
- Progress is achieved from simple to complex. Increasing the complexity of the exercises is accompanied by functional progress, so that higher levels of weight are added as needed at the appropriate time.
- Use the concept of progressive load. Increasing resistance is the key to success in functional training. Try to increase the number of repetitions or load every week. For exercises performed with your own weight, the progression is performed as follows: in the first week, three sets with eight repetitions (3x8) are performed, in the second week, three sets with ten repetitions (3x10) are performed, and in the third week, three sets with twelve repetitions each (3x12).

From the fourth week, you can generally progress by performing a harder version of the exercise or adding external resistance (dumbbells, Russian kettle bells, sandbags, medicine balls). In the application of the functional training program with persons with disabilities, the individual progress of each individual must be taken into account. There are only guidelines given here.

PERIODIZATION

Periodization is probably the most studied segment in the world of training. Periodization can be defined as the strategic application of specific training phases. It refers to the proper manipulation of all variables in training - frequency, intensity, volume, type of exercise, recovery periods. According to the traditional approach to periodization, periods of lower volume and higher intensity should be replaced with periods of large volume and lower intensity of exercise. The most important aspect of training periodization is proper planning of the recovery period, which is of special importance for the training of persons with disabilities.

Periodization can be seen through three types of cycles, which need to be properly designed: **macrocycle** refers to the entire training program or season; **the mesocycle** represents a certain smaller unit within the entire training program (e.g. the phase of cardiorespiratory fitness development), while the **microcycle** refers to the smallest unit of the mesocycle - usually one week.

PHYSICAL FITNESS ELEMENTS

Functional training, among other things, develops the elements of physical fitness. When it comes to physical fitness, it refers to the abilities needed to improve daily functioning through the patterns of movement that people use in everyday life. Physical fitness refers to the preparation for successful performance of daily activities. For example, squatting or grabbing objects from a high shelf are everyday activities that engage a large number of muscle groups. In achieving physical fitness, it is important to know that not every exercise is for everyone, since each person has their own goals, needs and level of fitness. However, for most people, exercises such as stepping, planks, pushing and pulling are useful, exercises that require performing in several planes. A large number of exercises for achieving physical fitness are performed with your own weight, but you can also use various equipment and external weight (dumbbells, elastic bands, medicine balls ...).

In order to achieve physical fitness, one of the three levels of functional training can be applied, depending on the applied intensity of exercising. Regardless of the part of the body that is being practiced, all exercises can be divided, according to the intensity and applied weight, into:

1. Basic exercises - they represent a general starting point for training. In relation to them, the following exercises are identified as progression or regression. Generally, the basic exercises are performed for three weeks, and then progression is applied. However, if a person feels difficulties in performing basic exercises, either due to injury or technical problems, they should immediately switch to regression, i.e. the intensity is decreased. This system of progression and regression is crucial for the proper performance and application of functional training.
2. Progression - is a step forward in relation to the basic exercises, and they are performed one after the other by the principle from easier to harder. Progression is achieved by

performing the exercise with your own body weight or by applying an appropriate external load.

3. Regression - exercises are performed in reverse order compared to progression, i.e. from easy, through easier to the easiest.

Proper application of selected exercises and loads achieves balance of the muscles and reduces the possibility of injuries.

Physical fitness refers to the ability of all body systems to work effectively together in order for a person to be healthy and perform daily activities without interruption. Physical fitness consists of a total of 11 components, five of a health nature, while the other six are related to abilities. All of them are important for performing physical activities. Here, special attention will be paid to health components. These are:

1. cardiorespiratory endurance - the ability of the whole body to exercise for a longer time without any rest. It requires a strong heart muscle, healthy lungs and permeable blood vessels in order for oxygen to be delivered to the muscle tissue without hindrance.
2. strength - represents the amount of power that muscles can produce. It is usually measured by the weight that the exerciser can lift or the resistance that he or she can overcome.
3. muscular endurance - the ability of a muscle to perform a movement several times without fatigue.
4. flexibility - the ability to fully use the joints in a wide range of motion without injury. The muscles should be long enough and the joints free enough to allow the necessary movement to be performed.
5. body composition - refers to the different types of tissues that make up the human body such as fat, muscle, bone and organ. The level or amount of body fat is usually used as a health-related component of body composition.

The components of physical fitness related to abilities are: balance, coordination, power, reaction time and agility.

GENERAL PRINCIPLES FOR EXERCISE PROGRAM DESIGN

Although the recommendation or transcript of exercises is individual for each exerciser, the basic elements of the exercise program are always common. Table 1 shows the types of training and examples of exercise models that optimize the improvement of each of the components of physical fitness. Exercise intensity dictates specific physiological and metabolic changes in the body during training. The initial intensity given for a particular exercise depends on the exerciser himself: what are the goals, age, abilities, limitations, level of fitness. Initial intensity should stimulate, but not overload, the cardiorespiratory and musculoskeletal systems.

Duration and intensity are inversely proportional. The duration of training depends not only on the intensity, but also on the individual components of the health status, the initial level of fitness, functional abilities and goals. The recommendation of the ACSM (American College of Sports Medicine) and the CDC (Center for Disease Control and Prevention) is that each

individual should have 150 minutes of medium-intensity or 75 minutes of intensive aerobic training per week. As the exerciser adapts to the training, the duration can be slowly increased by 5-10 minutes with a time interval of a week or two. For elderly people with a lower level of fitness, ACSM (2014) recommends increasing the duration rather than the intensity of training, which may also apply to some people with disabilities.

Frequency refers to the total number of workouts per week. Exercising three times a week is enough to improve various components of physical fitness.

Table1. Types of training for improving the physical fitness components

Physical fitness components	Training type	Exercise type
Cardiorespiratory endurance	Aerobic training	Walking, jogging, rowing, cycling, stairs climbing, aerobic dance, step aerobics
Muscular strength and endurance	Training with weight or resistance	Exercises with own body weight, exercises on gym machines, free-weight exercises, resistance band exercises
Flexibility	Stretching training	Static stretching, dynamic stretching, yoga, Pilates, PNF stretching

In order to design a quality functional training program of any type it is necessary to understand the eight basic principles that apply when recommending workouts:

1. Frequency - how many times a week to train;
2. Intensity – it is a measure of the effort invested in training;
3. Duration (time) - refers to the duration of one training session or interval;
4. Type - refers to the type of activity performed in training (running, swimming, cycling...);
5. overload - increased demand for the engagement of the muscular system;
6. Specificity - can be twofold: metabolic specificity and specificity of muscle contraction. Specificity refers to the selection of an adequate type of stress for the metabolic and musculoskeletal system;
7. Reversibility - refers to the loss of any type of acquired condition. The time required to lose fitness depends on the type (aerobic in 10 days, muscular in about 30 days);
8. Maintenance – of the current state of condition, which requires less effort and work than improving it.

CARDIORESPIRATORY FITNESS

One of the most important elements of physical fitness is cardiorespiratory fitness. Cardiorespiratory fitness is the ability to perform dynamic exercises of moderate to high intensity that involve large muscle groups over long periods of time (ACSM, 2014). Each assessment of physical fitness should include an assessment of cardiorespiratory function during rest and exercise. Depending on the initial level of fitness, adequate aerobic endurance develops over a period of 4 to 20 weeks (16-20 weeks for beginners in exercising, 12-16 weeks for individuals with a medium level of fitness and 4-12 weeks for exercisers in good condition). For continuous improvement, the cardiopulmonary and musculoskeletal system must be progressively overloaded by periodically increasing the frequency, intensity or

duration of exercises, always with only one element. Simultaneous increase in frequency, intensity and duration can overload the physiological system and increase the risk of injury.

Elements of cardiorespiratory fitness training

Every training prescribed as a part of an aerobic workout program should include the following phases:

- Warm-up (5–10 min): The purpose of warm-up is to increase blood flow in the working skeletal and heart muscle, increase body temperature, decrease the possibility of muscle and joint injury and reduce the chance of abnormal heart rhythms. During the warm-up, the pace of the exercise should be gradually increased in order to prepare the body for the higher intensity of the exercise performed during the training phase.
- Endurance training (20–60 min): During the endurance training phase, the aerobic exercise is performed according to the FITT-VP training regulation (i.e. F = frequency; I = intensity; T = time, duration; T = type, mode of activity; V = volume, quantity; P = progression). This phase usually lasts from 20 to 60 minutes, depending on the intensity of exercise. (Exercises of 10 minutes each are acceptable, as long as the exerciser has at least 20 minutes of training during the day).
- Cooling (5–10 min): The training phase is immediately followed by the cooling phase. A cooling phase immediately after endurance exercise is needed to reduce the risk of cardiovascular complications caused by abrupt cessation of exercise. During cooling, the individual continues to exercise (e.g., walking, running, or cycling) at low intensity for 5 to 10 min.
- Stretching (≥ 10 min): The stretching phase usually lasts at least 10 min and is performed after the heating or cooling phase. Static stretching exercises for legs, lower back, abdomen, hips, crotch and shoulders are usually included. Stretching exercises after the cooling phase can help reduce the chance of cramps or muscle pain.

MUSCLE STRENGTH AND ENDURANCE

Muscle strength and endurance are two important components of muscle fitness. Adequate levels of muscle fitness reduce the chance of developing lower back problems, osteoporotic fractures and musculoskeletal injuries. Muscle strength is defined as the ability of a muscle group to develop maximum strength against resistance in a single contraction. The force created by a muscle or muscle group largely depends on the speed of movement. Maximum force occurs when the limb does not move (i.e. at zero speed). As the speed of joint rotation increases, muscle strength decreases. Thus, the strength for dynamic movements is defined as the maximum power generated in a single contraction at a certain speed. Muscle endurance is the ability of a muscle group to exert submaximal force over an extended period of time.

Muscle ability can be improved by using different types of resistance training - isometric (static), dynamic (concentric and eccentric) and isokinetic. Although there are general guidelines for designing isometric, dynamic, and isokinetic resistance training programs, each exercise regulation (recommendation) should be individualized according to the specific

needs and goals of the exerciser. One of the most important regions that needs to be strengthened by applying strength training is the torso region, that is, it is necessary to strengthen the torso muscles.

Training for strengthening the torso muscles or "core" of the body

Many daily activities require the use of multiple joints and take place in different planes. They represent dynamic patterns of movement that require the transfer of power between the extremities. The muscles of the torso play a key role in transferring that power. Insufficiently strong torso muscles increase the risk of lower back injuries during dynamic and ballistic exercises. On the contrary, a strong torso: increases the efficiency of movement; improves muscle balance and coordination; improves posture and walking; increases strength and flexibility in the lumbar and pelvic region, as well as the sacroiliac joint; minimizes energy loss and improves power transmission.

Any training that affects the abdominal muscles, hips and shoulder stabilizers can be considered a training for torso strength. The word "core" has a broad meaning, with the intention of covering all the muscles in the middle part of the body. The primary function of specific muscles and muscle groups is **stabilization**. Functional training for these muscles refers to the training leading to better stabilizers, performing simple exercises through small volumes of movement. The information that serves as a guideline is that the three muscle groups requiring stabilization training are: **deep abdominal muscles, abductors and rotators in the hip joint, and scapula stabilizers**. These muscles are the vital connection between the strength of the upper and lower body. Therefore, these muscles should be considered anti-rotators, anti-extensors and anti-lateral flexors, and not extensors and flexors. It is wrong, for example, to develop a larger volume of rotating movement in the lumbar spine, perform rotational stretching and rotational exercises of dynamic warm-up. It has been scientifically proven that a large percentage of problems with lower back pain occur because the abdominal muscles are not able to maintain strict control over the rotation between the pelvis and the spine (at the level of L₅-C₁). It is important to develop the range of motion in the hip joint, both in internal and external rotation, in parallel with the development of the torso muscles as a stabilizer.

The connection between strengthening the torso muscles as a stabilizer and breathing is very interesting. The deep abdominal muscles, whose antagonist is the diaphragm, play a role in the stabilization of the trunk. The key to understanding the use of breathing in training for strengthening the torso muscles is to realize that the breathing process is not passive but an active process. Proper breathing achieves the interaction of eccentric and concentric contractions of the diaphragm and deep abdominal muscles.

When designing functional training, especially for people with disabilities, it is important not to start with strength training until the trunk muscles are strong enough to provide stability when performing movements. This improves the health and basic functionality of the body.

Stabilization exercises usually start with three sets of 25 s each divided into five sets of 5 s each. It is necessary to follow the concept according to which if you want effective training of stabilizers, then they must be given time to stabilize. Time can be used instead of the

number of repetitions to determine the length of the set. Five repetitions last approximately 30 to 60 s. These are general guidelines and can be adjusted based on the age, experience and type of disability.

For any exercise that uses body weight, progression over a period of three weeks is performed as follows: the first week: 3×8 (three sets of eight repetitions); the second week: 3×10 (three sets of ten repetitions) and the third week: 3×12 (three sets of twelve repetitions). After the third week, move on to the harder version of the exercise (usually referred to as progression 1), by reducing the number of repetitions, and following the same progression again. Trainers should dedicate time to trunk muscle strengthening training at least as well or better than any other aspect of the exercise program. A properly performed torso ("core") muscle strength training program helps reduce injuries, improve strength and speed, as well as the functional movements of everyday life, especially for people with disabilities.

FLEXIBILITY

Flexibility is the ability of a joint to move through its complete range of motion (ROM). It is important for sports performance (e.g. ballet, gymnastics), but also for performing daily activities. Maintaining the flexibility of all joints facilitates movement. Flexibility depends on a number of specific variables, including the extensibility of the joint capsule, proper heating, and muscle viscosity. In addition, flexibility depends on the alignment (i.e., tightness) of various other tissues such as ligaments and tendons that affect the ROM. Poor flexibility of the lower back and hips, along with poor strength and endurance of the abdominal muscles or other causative factors, can contribute to the development of pain in the muscles of the lower back.

Flexibility Training

Each flexibility training program aims to develop a range of movements of major muscle groups and tendons. It is seen through the characteristics presented by the FITT concept:

- **Frequency:** two to three times a week (it is most effective to exercise every day);
- **Intensity:** perform stretching up to a feeling of tightness or mild discomfort;
- **Time:** in static stretching the position should be maintained for 10-30 s, with the elderly 30-60 s; during PNF stretching, 3-6 s of mild to medium-strong contraction (20-75% of maximum voluntary contraction) are performed, followed by 10-30 s of stretching with assistance;
- **Type:** each type of stretching is effective; it is important to stretch all major muscle groups and tendons;
- **Volume:** it is reasonable to perform each flexibility exercise for up to 60 s;
- **Pattern (form):** flexibility exercises are most effective when performed with warmed up muscles after light to moderate aerobic activity or after warming up with external methods such as wet and warm packs or baths; each flexibility exercise should be repeated 2-4 times;
- **Progression:** the method of best progression is unknown, this is individual.

RECOMMENDATIONS FOR THE EXERCISES OF PERSONS WITH DIFFERENT TYPES OF DISABILITIES

For better daily functioning, exercises for people with disabilities should include three segments of developmental exercises: cardiorespiratory fitness, strength and flexibility. The goal and purpose of the exercises of each individual included in the exercise program is taken into account. This directly affects the frequency, intensity, duration, type, form and progression of the prescribed program. The following 5 tables will provide exercise recommendations for certain forms of disability.

Table 2. Training regulations for people with cerebral palsy

FITT recommendation	Exercises for the development of aerobic capacity
Frequency	1-2 times a week at the beginning, and three times a week later
Intensity	> 60% of maximum heart rate or 46-90% VO ₂ max (as a measure of cardiorespiratory fitness)
Duration	≥20 min in the period from 8 to 16 weeks depending on the weekly frequency;
Type	rhythmic activity involving large muscle groups, exercises on a hand or foot bicycle ergometer, treadmill or bicycle
FITT recommendation	Strength development exercises
Frequency	2-4 workouts per week with a break of at least one day
Intensity	50% -85% of a single maximum repetition
Duration	12 to 16 weeks, the number of repetitions of each exercise in one of the three sets should be 6-15;
Type	initially exercise with your own weight; strength development devices as well as free weights can be used

FITT: F - frequency, I - intensity, T - time, T - type

To develop flexibility, stretching exercises are recommended for spastic muscles and those that are not. Stretching exercises should be performed before and after aerobic exercises. The goal is to increase the volume of movements that are directly related to easier performance of everyday life activities.

Table 3. Training regulations for people with muscular dystrophy

FITT recommendation	Exercises for the development of aerobic capacity
Frequency	4-6 times a week
Intensity	50% -80% of cardiac reserve
Duration	20-40 min each training or until the onset of fatigue in beginners
Type	cycling, treadmill walking , manual ergometry and exercises on the trainer
FITT recommendation	Strength development exercises
Frequency	2-3 times a week, so as to provide a rest of 48 hours between two exercises

Intensity	start with 50% of one maximum repetition and with more than 10 repetitions, and in the course of time (it takes weeks and months) reach 75% of one maximum repetition with 10-12 repetitions in three sets (depending on the ability of each exerciser individually)
Duration	unspecified
Type	Exercises for developing strength and endurance of lower extremity muscles and strengthening respiratory muscles on a daily basis level, swimming

FITT: F - frequency, I - intensity, T - time, T - type

The goal of exercises for increasing flexibility is to increase the range of movement and prevent contractures. It is necessary to perform them daily so that the end position is maintained for up to 20 s during stretching.

Table 4. Training regulations for people with multiple sclerosis

FITT recommendations	Exercises for the development of aerobic capacity (in order to increase or maintain cardiorespiratory function)
Frequency	3-5 times a week
Intensity	60% -85% of maximum heart rate or 50% -70% VO ₂ max
Duration	Approximately 30 min each individual training, with a total program duration of 4 to 6 months
Type	Cycling, treadmill with a safety belt and swimming
FITT recommendation	Strength development exercises
Frequency	2-3 times a week
Intensity	50% -70% of maximum voluntary contraction, 8-15 repetitions in one to two sets
Duration	For the effect of the program 4-6 months
Type	Isokinetic exercises, exercises with weights, resistance bands and devices

FITT: F - frequency, I - intensity, T - time, T - type

For the development of flexibility daily stretching is recommended as the most effective method. The final position for each part of the body that is stretched should be maintained for 30 to 60 s with two repetitions. If there are contractures, longer stretching is needed, which can last over 20 minutes.

Table 5. Training regulations for people with spinal injuries (paraplegia and quadriplegia)

FITT recommendation	Exercises for aerobic capacity development
Frequency	3-5 times a week
Intensity	40% -90% of oxygen consumption reserve
Duration	10-20 min at the beginning, increase to 30-60 min in each individual training
Type	Hand bike ergometer, wheelchair ergometer, wheelchair treadmill, aerobics in a sitting position, swimming, electrical stimulation of leg ergometry with or without arm ergometry.
FITT recommendation	Strength training exercises
Frequency	2-4 times a week
Intensity	8-12 repetitions in 2 to 3 sets

Duration	4-6 months of continuous training
Type	Exercises with strength training devices, exercises with dumbbells or ankle weights that are placed around joints

FITT: F - frequency, I - intensity, T - time, T - type

To develop flexibility it is best to use one of the stretching methods. These exercises should be practiced before aerobic and strength training. The main goal is to prevent contractures.

Table 6. Training regulations for people with amputations

FITT recommendations	Exercises for the development of aerobic capacity (improving cardiorespiratory fitness and endurance of all extremities)
Frequency	4-7 times a week
Intensity	40% - 80% of cardiac reserve or VO ₂ max (on the scale of fatigue assessment with maximum with a value of 20 this effort corresponds to values from 11 to 16)
Duration	30-60 min
Type	Use various types of ergometers (sitting hand-foot, hand, standing hand-foot, bicycle, rowing), swimming
FITT recommendation	Strength development exercises
Frequency	2-3 times a week
Intensity	60% -80% of one maximum repetition or lifting weights whose weight allows a maximum of 8 repetitions
Duration	Time required to perform up to 5 different exercises (two for arm and shoulder girdle and leg muscles and one for torso muscles)
Type	Recommended use of power gym devices

FITT: F - frequency, I - intensity, T - time, T - type

For the development of flexibility, stretching should be used in order to maintain the optimal range of motion in the joint. For strength and flexibility training in terms of load dosing, the same mode of operation can be used as for persons without amputations (if there are no associated diseases).

With visual impairment, for an appropriate approach to physical exercise, it is necessary to keep in mind: how much and how visually impaired people see, their physical, functional and health condition, as well as ways of learning. The main problems in the realization of the exercise are related to: adaptation of teaching methods, adaptation of the exercise space and props and selection of appropriate equipment. Generally speaking, the same recommendations for the exercise program can be used as for people without visual impairment.

EXAMPLE OF EXERCISES FOR FUNCTIONAL TRAINING OF PERSONS WITH DISABILITIES

There is no general program of functional exercises for people with disabilities, given that there is a large number of forms and severity of disabilities. The only way is to try to perform a certain exercise in order to determine which exercise is appropriate and then the load dosing

elements. After choosing the exercises, you should try to perform three sets of up to ten repetitions, with a break of 30 s to 1 min between sets. In most cases, it is necessary to take a break of 48 hours between two trainings, in order for the muscles and joints to rest completely. Tissue that has been under stress needs time to recover.

In terms of intensity, one should always strive to improve the last performance through: increasing the resistance with which the exercise is performed, increasing the number of repetitions in a series or increasing the number of series. Increasing the number of repetitions in a set improves endurance, and increasing the applied external resistance improves strength. If all the given exercises are performed one after the other with a short break or without a break between sets, cardiorespiratory endurance will be improved. Example of exercises: 1) sitting and getting up; 2) seated dips (to strengthen the triceps); 3) raising the knee in a sitting position; 4) sit-standing-upright walking; 5) reverse crunches; 6) dorsal raises; 7) seated back extension; 8) seated reverse flys with dumbbells or resistance band in a sitting position; 9) seated shoulder press; 10) resistance band leg press; 11) getting up from the kneeling position and returning to the kneeling position.

EQUIPMENT USED IN FUNCTIONAL TRAININGS OF PERSONS WITH DISABILITIES

Functional training consists of exercises with body weight and progressive exercises with resistance. Exercises with body weight should be mastered first, and then higher external loads are added. Additional external resistance is not initially required while the person with a disability is learning movement patterns. It is necessary to master the pattern of movement, and then add resistance. For the concept of functional training, learning the movements before applying the load is essential. The following is a brief overview of some key pieces of functional exercise equipment and a few simple guidelines on how and when to use them.

Resistance bands and rings. In coordination and strength training, the intensity can be determined for each exerciser with the help of resistance bands. They are versatile and flexible in their use as equipment that provides elastic resistance. TRX is the most popular commercial model, but there are many types.

Medicine balls. They are made of rubber, in different sizes and weights, they can be bouncing or not. They can have holders and built-in ropes. Since the whole body is used in the exercises, the medicine ball can activate the entire kinetic chain. They are also used as weights to intensify exercise. They are used to create an asymmetrical and unstable training environment.

Massagers. They are of different colors, lengths and densities, all used for self-massage. The terms self-myofascial release, self-massage and soft tissue work are applied to the act of foam rolling.

Pilates balls (for stability). Trainers and exercisers should be careful when sitting on Pilates balls during dumbbell exercises or if they use a Pilates ball as a substitute for a bench press.

Ladders for agility. They provide dynamic warm-up that emphasizes each component (balance, foot speed, coordination and eccentric strength). They provide benefits to both the muscular and neuromuscular systems, while increasing muscle temperature.

Other equipment. For the needs of functional training, other equipment is also used: dumbbells, cones, small balls, Russian bells (kettle bells) of different masses. For training cardiorespiratory fitness, the following are used: hand ergometers, foot ergometers, recumbent bicycles (also used in a lying position), treadmill with a safety belt and pulse meters (in order to objectively monitor the intensity of training).

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