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APAS SWIMMING METHODOLOGY FOR PEOPLE WITH SPINE DISTORTIONS AND FLAT FOOT

Author: Sonya Savova, 2021

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INTRODUCTION

Global and regional processes in the development of society and its entry into the XXI century pose a number of challenges and problems to society, the state and the individual, which must be solved in a modern way. One of them is the care for protection, development and improvement of the human resource. Physical activity is a factor affecting mainly the younger generation and is especially important for people with various disabilities. Its importance is determined by its recreational nature and affects the body by restoring, training and mentally unloading, strengthening and improving health and habits, and enables the satisfaction of success. People who practice sports feel more useful to society and are more adaptable to a profession. Sports activity, in particular sport for people with intellectual disabilities, in accordance with their individual and specific features and forms, is perceived not only as a cultural, socio-economic and political phenomenon, but also as a basic need for development and excellence.

Swimming and exercises in the aquatic environment contribute significantly to accelerating the recreational and integration process of people with disabilities in society and provoke people with intellectual disabilities to perceive, try and express.

Swimming and exercise in water have numerous positive effects on psychophysical and health. The beneficial effects are especially pronounced in people with disabilities, as in a number of them swimming is the only independent physical activity.

The complex coordination and dynamics of the sport of swimming, the improvement of physical and mental qualities require a deep penetration into the problems of swimming training in people with spinal problems. In the direction of the theoretical aspects of the adapted motor culture, the adapted sport, the physical education and its goals and content in the modern conditions were published publications of Bulgarian and foreign authors.

It is necessary to know the characteristics of disability and disabilities in order to avoid contraindications and further disrupt the existing condition of the body. Related to this is the first section, which explains the main characteristics of some (most common) forms of disability, as well as the section containing practical advice and methodological recommendations in swimming training for people with spinal deformities and flat feet.

The spine is a basic structure in the human body. The spine makes the human body flexible and absorbs most of the heavy loads that children are subjected to every day. It provides the connection between the vertebrae, ribs, sacrum and skull. It consists of 33 vertebrae that form the Latin letter "S". The spine is probably the most important part of the musculoskeletal system. The spine must be in the correct position to be able to perform all its functions. The correct position is a condition in which a person's muscles and skeleton are in perfect balance, which in turn protects the supporting structures of the body from injuries and deformations during play or when the body is at rest.

Nowadays, a sedentary lifestyle and the unnatural postures that our children take every day while spending time in front of the computer have a negative impact on the correct position of the spine. Modern children now spend most of their time sitting, not playing. All this leads to an increase in the number of children with spinal deformities.

The flat foot in different people has specific characteristics that can be a contraindication for one sport and an indication for another. Swimming can relieve swelling when the foot is flattened or, conversely, lead to increased pain. It all depends on the characteristics of the pathology and the style of swimming.
As of the end of 2016, 12.5% of children in Sofia suffer from spinal deformities. There has been a sharp increase in this percentage in recent years. In most cases, spinal deformities are reversible, but most parents never notice that their children suffer from spinal deformities. If you suspect that your child has a similar problem, consult a specialist immediately. Treatment for children with spinal deformities consists of physiotherapy and water exercises, massages, swimming, correcting body posture, including sitting.
Water exercises are extremely useful for children with spinal deformities. Healing swimming for children is very useful for children with spinal deformities, as the movements are not strenuous, due to the fact that the pressure on the spine is much less, because the water reduces body weight. The cooling effect of water is very important. Leads to stimulation of blood circulation in body tissues. Muscles can work much better because water provides resilience, thus improving flexibility and endurance. Healing swimming helps to strengthen the muscles of the arms, legs and back, which automatically improves the balance of the back and the whole body. Recommended for children with spinal deformities.

PATHOLOGY OF SOME FORMS OF SPINE DISTORTIONS

To successfully conduct swimming training or some other form of exercise for people with spinal deformities, it is necessary to know the characteristics of the injury itself. In this sense, the pathology will be explained, respectively, brief explanations for scoliosis, kyphosis and lordosis will be given.

Scoliosis - is a disease that causes curvature of the spine to the side. Distortion can range from mild to severe. Children develop scoliosis at a very early age. The reason for this is the rapid growth in the period before puberty. Scoliosis is the most serious type of spinal deformity. If left untreated, it can lead to chronic back pain. Functional scoliosis is the most common type. It is characterized by a change in the shape of the spine. This form of the disease is treated by swimming, proper posture, physiotherapy exercises for scoliosis.

Kyphosis - is a deformity of the spine, which is characterized by an unnatural curve of the spine in its upper part. The so-called hump appears. Kyphosis is caused by weak back muscles, improper posture, disease, malnutrition at an early age. Kyphosis is treated with swimming, proper sitting and posture, special physiotherapy and water exercises.

Lordosis - is a curvature of the spine in the lumbar region. It is expressed in the curvature of the vertebrae to the abdomen. Characteristic of lordosis is pain in the lower back. Feeling uncomfortable sitting in the right position. Lordosis is caused by improper posture, weak lumbar and abdominal muscles. Lordosis is treated with physiotherapy, stretching and swimming.

PATHOLOGY OF SOME FORMS OF FLAT FOOT

The congenital flat foot (talus verticalis) is the most severe form of pathological flatfoot, but its frequency is relatively rare. The rigid talus verticalis must be differentiated from the so-called "Oblique talus", which has a good prognosis. The oblique talus is a plantar flexed talus caused by hyperlaxity, while the talus verticalis is - flexors of the foot. The head of the talus protrudes along the plantar sole surface, causing convexity of the sole. The vertical talus is fixed in contrast to the oblique talus, in which the middle and hindquarters move freely. In plantar flexion in the oblique talus, the first metatarsal bones are in line with the axis of the talus, while in the vertical it is not. Particular attention should be paid to the motility of the calcaneus. If it is fixed in plantar flexion on both lateral radiographs (in plantar and dorsal flexion), the diagnosis is vertical talus.

The acquired flat foot (pes planus) is a foot with a large contact plantar surface, with a pronounced valgus of the heel and a low longitudinal arch. The physiological flat foot is elastic, common and is a variation of the normal foot. It occurs in almost all children up to 3 years. age, in most - to puberty and in 15% of adults. Flat feet are more common in some families, especially those with increased joint laxity. The hypermobile flat foot is observed with growth and at puberty as a variant of a normal foot. Clinical examination often reveals generalized joint laxity, which, however, decreases with puberty. The child rarely has pain and severe fatigue during exercise. When stepping in an upright position, the foot does not have a longitudinal arch and its heel is in a pronounced valgus. If the arch of the foot appears when the child steps on the toes or when the big toe is stretched upwards, the flat foot is elastic. The movements in the subtalar joint are complete. No radiographs are needed. The elastic flat foot is the most common reason for examining children by an orthopedist due to parental concerns, but it is a cosmetic rather than a functional problem. Elastic flat feet rarely require treatment. The use of orthopedic shoes or insoles and insoles for shoes is not effective, it is expensive and makes the foot "lazy". In general, this does not affect the child well, because it imposes a feeling of inferiority. It is recommended to walk barefoot to stimulate the plantar receptors, as well as to wear soft and elastic sports shoes with an easily bendable sole. Surgical treatment is required for feet with severe deformity and pain syndrome.

DIAGNOSIS

The correction of flat feet in children in early childhood has a favorable prognosis if you start from 10-12 days of life. Then complete recovery is achieved with little effort and in a short time - within 2-3 months. The main medicine at this stage is the massage of the legs with their straightening. Later therapy is prescribed depending on the severity of the disease:

• A drug characterized by mild deformity of the feet and mobility of the ankle. Therapy includes foot massage, light physical activity, application of soft fixative bandages.

• Medium, manifested by more severe deformity and stiffness of movements in the ankle joint. Along with massages and physiotherapy exercises it is treated by placing the foot in a plaster cast;

• Heavy, characterized by severe curvature of the feet and immobility of the ankle. This is an extreme case in which surgery is recommended.

There are different methods for correcting flat feet, and in each case the doctor chooses the most appropriate.

First, the child is prescribed conservative complex therapy:

• physiotherapy procedures;

• applications using paraffin;

• therapeutic gymnastics, kinesitherapy;

• swimming

Using swimming to fight scoliosis

In the first and second degree of scoliosis, doctors recommend that patients engage in swimming. Swimming with scoliosis has a positive effect on the back muscles and relieves unpleasant symptoms. But if a person swims in freestyle, then he will hardly be able to achieve the desired effect. To achieve the desired effect, one must swim in a certain way. It doesn't matter if you are swimming in a pool or in a river. The main thing is to swim properly and it is desirable for an experienced specialist to monitor the process.

How does it help and what effect can it have?

As we said, swimming and scoliosis are inextricably linked. Swimming helps to strengthen the muscular corset. Many patients do not believe that it has this property. And this is in vain. It really helps to strengthen the muscular corset and get rid not only of scoliosis, but also of other diseases of the back. For example, it can cause osteochondrosis. Swimming prevents its development. This is because the reinforced muscular corset helps the spine to return to the correct position and the load during training is evenly distributed throughout the body without overloading individual areas. Therefore, in patients with curvature of the spine who are actively involved in swimming, the muscles of the back rest.

Remember that swimming will not help people with scoliosis to develop deformities in the spine, but the speed of their appearance will be slowed down somewhat and the risk of complications that are dangerous to the patient's health will be reduced.

Therapeutic swimming technique for scoliosis

• During swimming, the spine is unloaded, the spinal muscles relax and strengthen, the blood circulation is activated and the correct posture is formed. Scoliotic changes often lead to disorders of the cardiovascular and respiratory systems. Therefore, in addition to physical swimming skills, it is necessary to master the technique of breathing exercises.

Perform breathing exercises in water

• While standing, place your hands on the side of the pool. Take a deep breath, hold your breath and dive headlong into the water. Lower your head and exhale into the water, then return to the starting position. Repeat the exercise 15-20 times.

• While standing in the water with your back to the pool wall, take a deep breath. Do a squat completely submerged. Start exhaling slowly (exhalation should stretch for 20-30 seconds). Exit, take a breath and repeat the steps 5-10 more times.

• Lie face down on the water, grab your hand by the pool. To maintain the starting position, perform alternating movements of the legs up and down, with a small amplitude. Inhale and then exhale into the water (diaphragm breathing is recommended). The exercise should be done for 1-2 minutes.

Swimming in different styles

1. Swimming on the back (alternating movements of the arm). Take a position parallel to the surface of the water, place your hands on your body, your eyes are on the ceiling. Start making alternating movements of your legs up and down, at the same time slowly begin to alternate your arms. This way you have to swim 200 meters.

2. Swimming on the back (simultaneous movements with both hands). Take the position of the body by analogy with the previous exercise, but now you will have to row with both hands at the same time. Swim 100 meters.

3. Breaststroke. This style of swimming appeared in antiquity about 10 thousand years ago and today is one of the main types of swimming used to treat scoliosis. Breaststroke is performed on the chest, while the left and right limbs make symmetrical movements in a horizontal plane parallel to the water surface. The swimming distance must be 300 meters.

4. Crawling. It is considered one of the fastest types of swimming. This is a method of swimming the stomach, in which the arms alternate sequentially along the axis of the human body, and the legs alternate up and down. The person's face is placed under water most of the time to take a breath, the head periodically turning to the side during the impact. Swim 200 meters in this style.

5. Butterfly. Swimming with this style is considered the most difficult and physically exhausting. The butterfly is a type of swimming in the abdomen, in which the left and right limbs perform symmetrical movements (arms - powerful blows, and legs - wavy movements). Swim 200 meters in this style.

- • In total for 1 lesson you have to swim about 1000 meters in different styles. Classes should be held no more than 2-3 times a week. If for some reason you cannot perform such a volume load, reduce the swimming distances to an acceptable level for you. People who do not have enough swimming skills can buy special swimming boards made of plastic, upgraded foam, polyethylene foam and other materials.
- • In addition to the positive effect of scoliosis, swimming has the effect of emotional relief, has a general health and hygiene value. With regular exercise, lung capacity increases, thermoregulation improves, flat feet are corrected, heart rate is optimized and immunity is strengthened. It is also recommended to combine swimming with physical therapy at home.
- Elements of swimming in shallow water
- • To apply the proposed exercises in shallow water, the lack of swimming skills is not an obstacle. The shallow part of the pool is suitable for the following exercises:
- 1. In a chest-to-chest position in water with your legs wide apart, lean forward. After taking a deep breath, exhale for a long time in water. Make hand movements with a breast ..
- 2. In the side rail of the pool. On the abdomen: keep your legs straight and open in an upright position, perform alternating movements with crawling and breaststroke. On the back: do the same, but with the addition of a leg movement called "cycling".
- 3. Slide parallel to the water surface with your arms outstretched. Pushing from the side, try to practice kicking, breaststroke and other styles of swimming.

• Performing these exercises, you can strengthen the muscles, improve coordination of movements and over time to fully master the technique of swimming in different styles.

• It is worth noting that the described styles of swimming and exercises in the water can be used in the presence of scoliosis of grade 1 and 2. For more complex forms of deformity (grade 3 and 4) the training program should be chosen exclusively by a qualified specialist.

Recommendations for swimming procedures

• When performing physical activity, you should take into account your age, individual characteristics of the body and the degree of readiness for such loads. Before you start swimming, you should consult your doctor and dermatologist. During classes you must adhere to the general principles:

• In scoliosis, jumping into the water and somersaults is prohibited. Technically difficult movements can be harmful.

• It is necessary to exclude rotational movements of the spine around the axis.

• Do not stretch the spine with special devices.

• Proper breathing is the basis for the effectiveness of water procedures.

Using swimming to combat kyphosis

Therapeutic swimming differs from sport swimming in the same way that medical gymnastics differs from sport gymnastics.

It is very important to carry out treatment with kyphosis under the supervision of a swimming coach.

Only an experienced specialist will be able to choose the appropriate exercise regimen, set of procedures and control the correctness of the exercises.

It is difficult to overestimate the impact of water on the human body. During swimming, the patient is placed in a state of partial weightlessness, the load on the spine is reduced and at the same time the corrective processes are intensified.

Therapeutic swimming program for kyphosis

According to doctors, the kyphosis treatment program should consist of three periods and last approximately 9 months.

The frequency of classes should not be less than 2 times a week, and the duration should be from 45 to 60 minutes per lesson.

The most effective method of training is not individual, but group.

The therapeutic swimming program includes 3 periods:

Preparatory

At this stage of the training the coach has the task to learn the group techniques of swimming, rhythmic breathing, to conduct procedures for general hardening of the body, to work to improve the condition of the cardiovascular system and strengthen muscles.

At this stage, the group must master the technique of swimming the bust.

Main period

The second stage of programmed treatment is focused on corrective and stabilizing goals.

As a result of a number of exercises, the muscles of the trunk are strengthened, a positive effect on the circulatory and nervous systems of group members, the correction of the spine and the strengthening of healthy posture skills. The swimming techniques learned during these periods are combined and applied systematically.

• At this stage, short-distance swimming with increasing speed and diving is practiced.

Final

• At this stage the load is reduced, for a smooth exit from the intensive training regime.

Swimming technique and training program

• Based on this, groups with the most similar forms of kyphosis are formed.

Doctors recommend the following swimming exercises:

1. Inhale and exhale in the water. The exercise is performed in a squatting position or in a lying position, face down, in the version with a squat it is necessary to keep on the edge of the side, head above the water. Take a deep breath, and when exhaling the person should be immersed in water. The frequency of performance is 4-6 times in one approach, but not more than 20 per lesson. Promotes breast development, improves lung ventilation.

2. Inhale through the mouth, exhale through the nose and mouth. The exercise should be performed in shallow water, holding the edge of the side or railing with your hands. Starting position: squat, head above the water, take a deep breath through your mouth and exhale quickly through your mouth and nose. The frequency of execution is 8-10 times. This exercise sets the right breathing and develops the respiratory muscles.

3. Back to back with both hands. It is performed lying on the water face up in a horizontal position, hands on the body, the gaze is directed to the ceiling. During the exercise, the legs perform alternating swings, the arms are raised simultaneously. Inhale in the starting position, exhalation accompanies the swing. The hands are straight. To prevent the neck muscles from resetting, do not lift your head out of the water. The distance traveled is 200 meters. Promotes the development of the muscles of the trunk and respiratory system.

4. Swimming on the back, arms consistently. The starting position and the rules for performing the exercise correspond to the third paragraph. The differences in the performance of the removal of the hands, the strokes are performed sequentially, the inhalation and exhalation are distributed on the same principle, but for each hand separately. The movements are slow, breathing is even and deep. Distance 100 meters.

5. Swimming with the chest is performed in a horizontal position facing the water. Particular attention should be paid to the technique of controlling breathing and exercise. Distance at a leisurely pace 25-200 meters, with a speed of 10-25 meters. Loads are determined by the level of training.

6. Swimming crawls. This exercise is performed on both the chest and the back. When performing, the rotation of the body should be avoided and the lower back should be kept in good shape. Distance 25-200 meters, depending on physical fitness, swimming is possible at a speed of not more than 20 meters in one approach. This exercise helps to develop the muscles of the trunk and limbs. Trains the respiratory muscles and develops endurance. Distance 100 meters.

7. Swimming butterfly. It is performed lying on your stomach horizontally in relation to the water. The hands should be carried in an even position and the blow with the arms bent. Inhalation is performed during the impact. Distance 100 meters.

8. Back with two hands at a distance of 100 meters. It is performed similarly to the above exercise, but at a distance of not more than 100 meters in one approach.

9. At the end of the workout you should repeat the breathing exercises.

- Breathing exercises
- • Standing upright, make circular movements with outstretched arms 5 times, inhale, exhale into the water, repeat the inhalation and exhale. Repeat the exercise with swings in the opposite direction. • While lying on the water, turn face down, hold on to the railing; to maintain a horizontal position, perform creeping movements with your feet. Exhale in the water. Duration 1-2 minutes • While standing in the water, inhale, sit and exhale slowly in the water. Repeat 10-15 times. • Jump out of the water as high as possible. Start with 3-5 times, increase the load gradually to 10 timesGenerally speaking, from the point of view of the biomechanical model of the correct implementation of competitive swimming techniques for the Olympic population of swimmers, the modification of swimming techniques for people with disabilities refers to: adjustments of hand movements in terms of amplitude, frequency, distance, strength and efficiency of raking; corrections of leg movements; corrections of the ideal position of the body in the water relative to the angle of swimming, degree of rotation relative to the sagittal, frontal and horizontal planes;

corrections of the synchronization of the paddles with the arms, the movements of the legs and the breathing, i.e. of inhalation and exhalation during swimming.This section will explain the modification of crawl, breaststroke and back swimming techniques for people with spinal deformities. The included modifications show the way swimmers should swim and perform swimming exercises according to the type and degree of disability.

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- **Modification of swimming techniques**
- In the back, breaststroke and crawl swimming techniques, the typical mistake of uneven paddling is made. Possible solutions to the problem or modifications are the following:

1. lateral flexion of the head;

2. reduction of the raking force;

3. placing a shovel;

4. in the case of the breaststroke swimming technique, in addition to the given modifications for the back technique, it is possible to perform rowing by hand closer to the central line of the body and to increase the raking force;

5. in the crawl swimming technique, in addition to the given modifications for the back technique, the rowing by hand can be performed slightly laterally to the central line, and the rowing by hand directly in the direction of the central line;

6. In the crawl swimming technique there is a problem with the inhalation of air, which can be solved by increasing the rotation of the body and its return above the head.Модификация на плувните техники за хора с хемипареза

With the back swimming technique, there is a problem with the hypertonic side of the body turning downwards. Possible modifications are the following:

1. turning the head on the hypertensive side of the body;

2. lowering of the strong shoulder and pelvis for turning the torso on the opposite side;

3. use of a swimming belt.

In these people, pain in the shoulder joint may occur when returning the arm to the head in the reverse phase of the scoop. In such a situation, backstroke swimming techniques should be avoided.

The breaststroke technique presents a number of difficulties during swimming, such as breathing control problems due to poor motor control or spasticity, sinking due to reduced efficiency of leg movements, and uneven paddling due to poor motor control and spasticity.

In connection with the first problem, the possible modifications are the following:

1. use of a snorkel swimming mask;

2. use a swimming belt or inflatable shoulder straps under the arms so that the head is above the water at all times.

In connection with the second problem, the possible modifications are the following:

1. instead of completely correct movement of the legs, for the breast technique the movements with less rotation in the joints are used;

2. use of assistance or swimming belt when performing movements.

In connection with the third mentioned problem, the raking is modified in such a way that with a healthy hand rakes are performed closer to the central line of the body.

In the crawl swimming technique, there is a problem with breathing control due to poor motor control or spasticity, which can be solved in such a way that when inhaling the swimmer rotates his body around the longitudinal axis, moving from the abdomen to the back.

In addition to this problem, uneven scooping with the hemiparetic arm occurs, leading to a deviation to the side of the body with hemiparesis. Possible modifications are the following:

1. lateral flexion of the head on the hemiplegic side of the body;

2. reducing the strength of the scoop with the healthy hand in order to equalize the force of the scoop with the hemiparetic hand;

3. directing the force of movement of the legs to the hemiplegic side.

Sinking also occurs due to the reduced efficiency of the foot movements. Possible modifications are the following:

1. instead of fast movements of the legs it is recommended to perform small controlled movements;

2. increase the flexion in the knee joint when moving the legs to reduce spasticity, if possible;

3. use of assistance or swimming belt.

2. by using an assist or a swimming belt until the swimmer increases the power of rowing and control over the body.

With the breaststroke swimming technique, there are difficulties in controlling breathing due to the weak extension in the neck and the weak force of the paddling. Possible modifications in solving this problem are the following:

1. intake of air on every 5th scoop;

2. increase the raking force at the moment of intake of air so that the body can rise sufficiently above the surface of the water with minimal extension in the neck;

3. use of inflatable shoulder straps, which are placed under the arms.

In the crawl swimming technique, there is a problem with the inability to extend the arm above the water surface in the reverse phase of the scoop, which makes it difficult to absorb air, and the force of the scoop is also reduced. Possible modifications are the following:

1. intake of air on every 5th scoop;

2. performing an expressive rotation of the body around its longitudinal axis when taking in air by passing from the position on the abdomen to the position on the back;

Another problem that arises is the sinking of the legs due to spasticity. The problem can be solved with an assist or a swimming belt until the swimmer increases the strength and efficiency of the rowing.

SWIMMING METHODS

In order for people with spinal deformities to benefit from the positive effects of swimming, they must first learn to swim. The Halliwick method is used for this purpose. The positive effects of movement and exercise in water are achieved by applying effective and proven methods such as the Bad Ragaz Ring method and the Watsu method.

Halliwick method for swimming and water exercises

The Halliwick method for learning to swim, first as an idea and then as a method, was developed by James Macmillan in 1949 in London. The main purpose of this method is to enable children and adults with disabilities to swim, ie. to move independently and safely in water. The essence of this method is in the process of psycho-sensory-motor training, which is effective in people who need active training to move in another environment (eg water), ie. from re-learning to move in an environment where natural movements are mechanically difficult. At its core, the Halliwick method is a ten-point program with a main focus on the dominant learning of postural control of the body in water when learning to swim. All this is based on the principles of mechanics and hydrodynamics of floating and moving bodies in water. The points of the Halliwick program are the following:

1. Mental adaptability;

2. Control of sagittal rotation;

3. Control of transverse rotation;

4. Control of longitudinal rotation;

5. Combined rotation control;

6. Ejection;

7. Equilibrium at rest;

8. Sailing with the help of turbulence;

9. Gradual progress;

10. Basic (Halliwick) swimming.

By successfully mastering and fully implementing the said program, the swimmer must be prepared to move independently in and on the surface of the water, using a technique involving swimming in a floating position on his back and at the same time paddling with both hands. The goal of the Halliwick program for human motor training is first to learn the position of sailing on the back with full control of maintaining a stable balance in the water,

and the next goal is to master the phase of controlled and purposeful movement on the water surface, ie. . to acquire motor skills in swimming.

Bad Ragaz Ring method for swimming and water exercises

The Bad Ragaz Ring (BRRM) method was originally created about 80 years ago by therapists at the Bad Ragaz thermal spa in Switzerland. Unlike the passive use of thermal waters in swimming pools, they have begun to apply active hydrotherapy procedures. During its application, hydrotherapists have realized that with the help of floating aids (rings, balls, boards, etc.) in different positions with the task of stabilizing parts or the whole body (sailing on his back, sitting in water, etc. .) and with the realization of different types of loads that can be applied in water (isometric, isokinetic and isotonic), a significant positive effect on the health of the trainee can be achieved. In other words, the application of floating aids and controlled loading in different positions of the body in the water achieves a positive neuromuscular effect according to the principle of proprioceptive neuromuscular facilitation.

This stimulates the remotor learning of movements under the conscious control of the CNS and active muscles and muscle groups. The positive effects are achieved by applying specific water resistances during movement and extension of the spine under the influence of the earth's gravity or additional load on the tail of the body in the water. This leads to increased energy consumption, which has a positive effect on overall and local muscle endurance. Then there is an overall relaxation effect in the sense of reducing muscle tone as a consequence of the specific pressure of water on the entire surface of the body and skin. There is also an increased degree of mobility due to the effects of temperature, ie. the warmth of the water and the relaxation of the tendons and connective tissue, as well as the overall effect of reducing muscle tone due to the reduced activation needed to maintain a stable balance on the ground.

BRRM involves therapy performed in 33oC warm water in a small pool about 120 cm deep so that the instructor can actively assist, as the ideal position for him is to be able to hold the trainee between the eighth thoracic and eleventh thoracic vertebrae. while sailing. Aids in the form of floating rings, floating boards or floating belts are used to achieve a perfect sailing in a completely relaxing position. They are placed around the neck, torso and ankles, while floating boards or load belts are used for sitting or standing floating positions.

During active therapy, the isometric load is provoked by maintaining static body positions in the floating phases, which mainly refers to the torso muscles in the phases of torso stabilization. Isotonic contractile provocation is achieved by movements to maintain tone, ie. movements, with the help of which the most uniform water resistance is realized. Isokinetic contractions are provoked during movements in water at the same rate, as agonist, antagonist and synergist muscles are provoked for a given tension.

In general, BRRM is extremely useful for people experiencing pain during movement, in people with reduced joint mobility, spasticity, loss of coordination, decreased muscle tone, etc.

Watsu swimming method

This method is a synthesis of the BRRM method and Shiatsu massage. The Watsu method is a relatively "young" method, as it was first introduced in 1980 in Northern California. The essence of this method is in the combination of sailing and movement on the water

surface in various static positions, characteristic of BRRM, with light and gentle rhythmic movements of the limbs, which have a positive effect on the whole body of the trainee.

With this method the program is also realized in a small pool, in warm water (33oC - 34oC), with intensive active assistance of the instructor, who helps in accordance with the principles of the BRRM method (during sailing, if necessary, holds the trainee between the eighth thoracic and eleventh thoracic vertebrae). It should be emphasized that, unlike BRRM, the Watsu method does not use auxiliary vessels, but only the instructor holds the trainee and manipulates his movement in the water in a controlled manner, ie. performs therapeutic tasks.

The positive therapeutic results of the application of the Watsu method can be systematized as follows: reduction of muscle pain, increase in the range of motion, increased level of physical abilities and better kinesthetic perception.

RECOMMENDATIONS IN SWIMMING TRAINING

The application of physical exercises in people with spinal deformities and flat feet is characterized by pedagogical and professional-practical specifics in comparison with the methodology applied for persons without disabilities. When we talk about the methodology of training in swimming and swimming training, it is essential that it be adapted to the specific capabilities of the trainee depending on: level of physical abilities, ability to adapt, level of motivation, different types of anxiety, as well as the comprehensive capacities of the trainer for training and coaching work. People with different forms of deformities and flat feet have common characteristics such as contractures and restrictions in movement, high muscle tone and others. These general characteristics allow the application of the same practical advice or methodological recommendations for swimming training as well as for swimming training. Below are some of the methodological procedures related to the general characteristics of disabilities

- **Contractures and limitations in the range of motion**
- These types of motor limitations occur most often in people who have: spinal cord injuries; traumatic head injuries, paralysis or paresis, etc. The methodological recommendations for learning to swim are the following:
- • in the initial phase of the warm-up the exercises are performed very slowly with a slight intensity;
- • providing a variety of different exercises for walking, jumping, climbing and descending the stairs in the pool for people with plantar flexor contractures;
- • insisting and encouraging swimmers to perform movements with maximum range;
- • movements in a contracted joint should never be forced;
- • adaptation of the rake depending on the traffic restrictions.

- • changing the position of the head and using appropriate floating means and weights to establish a suitable floating position and rational position due to the negative impact of paralysis;
- • modification of the swimming techniques, the ways of entering and exiting the water on an individual basis after determining the stability of the torso, the strength of the limbs and the control of the head of each individual swimmer;
- • promoting individuality and independence in swimming lessons;
- • providing a mat around the pool for people who need to rest by the pool to avoid scratches and skin injuries when moving;
- • taking into account fatigue and correspondingly increasing the duration and frequency of breaks, as well as the duration of the hour, especially taking into account the possible occurrence of muscle spasm;
- • swimmers should wear socks to prevent scratches due to scraping;
- • work to develop the muscular strength of the upper body, with special emphasis on strengthening the deltoid muscles and stretching the pectoral muscles.

  High muscle tone

  The methodological recommendations for learning to swim for these people are the following:

  • mandatory training in swimming in warm water with a temperature of 30oC to 33oC in order to obtain the effect of muscle relaxation and reduce spasticity;

  • during swimming training special attention should be paid to the fact that spasticity can cause the so-called. "Scissors", i.e. crossing of the outstretched legs, which often causes pain and wounds in the knee area, and therefore the preventive use of floats or floating belts placed at the height of the knee joint is recommended;

  • assistance near the swimmer's head due to involuntary and sudden spastic movements, which can lead to a sudden sinking of the swimmer and splashing of other swimmers around him;

  • insisting on light and slow movements in the water and avoiding sudden, intense and fast movements that cause an increase in muscle tone;

  • active help of the coach is needed in terms of directing the movement in the water in the desired direction;

  • Careful entry and exit of the swimmer from the pool due to possible sudden spastic movements.

  • use of symmetrical swimming techniques such as breaststroke, backstroke with simultaneous paddling with both hands and leg movements as in breaststroke;

  • Careful swimming on the back, as the extension of the neck can stimulate a symmetrical tonic reflex of the neck, which leads to stretching the arms and bending the legs.

  • enabling these people to learn to swim between two instructors, using aids such as large hoops, or up to swimming lanes;

  • using agreed short words as a reminder of what the swimmer should do;

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