

# RESPONSES AND MUSCULAR ADAPTATIONS OF PHYSICAL ACTIVITY APPLIED TO PEOPLE AFTER STROKE

## RESPUESTAS Y ADAPTACIONES MUSCULARES DE LA ACTIVIDAD FÍSICA APLICADA A PERSONAS TRAS UN ICTUS

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### Resumo

O Acidente Vascular Cerebral é uma lesão no tecido cerebral decorrente de um problema causado pela má circulação sanguínea, os benefícios das atividades ou exercícios físicos para pessoas que tiveram Acidente Vascular Cerebral têm demonstrado melhora na resistência, equilíbrio e mobilidade, além de melhora na qualidade também é observada. de vida devido às diferentes modalidades existentes na área da Educação Física. Este artigo tem como objetivo investigar a anomalia conhecida como acidente vascular encefálico, revelando se os exercícios físicos podem influenciar no processo de recuperação de pessoas que apresentam sequelas. A metodologia utilizada foi uma revisão de literatura através de obras e artigos científicos.

**Palavras-chave:** Acidente vascular cerebral. Adaptações musculares. Exercício físico.

### Abstract

The Cerebral Vascular Accident is a damage to the brain tissue resulting from a problem caused by poor blood circulation, the benefits of activities or physical exercises for people who have had a Cerebrovascular Accident have shown improvement in resistance, balance and mobility, and an improvement in quality is also observed. of life due to the different modalities existing in the area of Physical Education. This article aims to investigate the anomaly known as cerebrovascular accident, revealing whether physical exercises can influence the recovery process of people who have sequelae. The methodology used was a literature review through works and scientific articles.

**Key words:** Brain stroke. Muscle adaptations. Physical exercise.

## Introdução

The Cerebral Vascular Accident (CVA) occurs when vessels that transport blood to the brain are obstructed or ruptured, causing paralysis of the cerebral area, which, consequently, was left without blood circulation. It is currently one of the leading causes of death and can also cause motor disability and hospitalizations (SANTOS, 2012).

Physiologically, the human body, in order to maintain its balance of homeostasis, needs optimal functioning of all its vital organs and especially the kidneys, as they are responsible for eliminating catabolic substances from the body through liquid control and also through filtration of blood, maintaining the vital function of the organism (SANTOS et al., 2017).

According to the Ministry of Health the kidney has several vital functions and that all of them are essential for the organism to stay alive and functioning. The main ones are:

- Excretion of end products of various metabolisms;
- Control of acid-base metabolism;
- Control of hydroelectrolyte balance;
- Blood pressure control.
- Hormone production;

The evolution of the disease is quite slow and in some cases silent, which allows the body to undergo different changes that arise according to the progression of the disease, and therefore there are cases in which the symptoms only appear when the disease is found. in the last stage (SANTOS, 2017).

It is possible to detect the probability of a person suffering a stroke, because the faster the diagnosis, the greater and more effective the chances of complete recovery of the patient. In this way, it becomes essential to be aware of the signs and symptoms and seek immediate medical attention.

Physical exercise is a great ally in both treatment and prevention. The literature defines physical exercise as a series or sequences of standardized and synchronized movements that physiologically provokes in the muscles of its practitioners, caloric expenditure above the consumption of the resting state of the musculature, that is, during the practice of a type of physical exercise or caloric expenditure during its practice is higher than the caloric expenditure of the body in its basal state (SANTOS et al., 2022).

Regular physical exercise improves strength, muscle mass and joint flexibility, reflecting positively on everyday life, in addition to contributing to the different needs of life (NASCIMENTO et al., 2022).

Alves (2019), highlights that the benefits in a person's well-being are totally relevant. By practicing physical activity, cerebral blood flow improves and this, in addition to favoring the reduction of stress, anxiety and depression.

There are several benefits that physical exercises can bring to this population, as well as weight loss, muscle mass gain, strengthening, improvement of body posture, muscle stiffening, also important for rehabilitation, in addition to preventing cardiovascular diseases and helping to control of body weight prevented obesity. Therefore, it is worth mentioning the importance of always looking for qualified professionals (CRUZ, 2019).

In this way, the Physical Education Professional comes up with a fundamental role in providing services to this population and they need to be prepared to adapt to the progressive limitations of this disease that can be seen as a justification for physical inactivity, the regular practice of physical exercises is fundamental aspect for the promotion of the health of these people.

## Methodology

Being a bibliographic review based on articles, monographs, books and separate research, which were of fundamental importance for the understanding and construction of the present work, this strategy makes it possible to analyze, review, interpret and even criticize theoretical

considerations, making it possible to create new proposals for explaining and understanding the phenomena and facts of the most different areas of scientific knowledge (LAKATOS, 1991).

As well as the recommendations of the Ministry of Health, which conducts several surveys on this population in Brazil and seeks to create protocols to provide adequate treatment.

## Theoretical foundation

The incidence of stroke has increased in a worrying way related to the age of people and studies have concluded that it affects more men than women, and in relation to sex, the incidence is 2 times higher in people classified as black than in people classified as white. (O'SULLIVAN; SCHMITZ, 2004).

There are two types of stroke, hemorrhagic and ischemic. Hemorrhagic stroke: occurs when a cerebral vessel ruptures, causing internal bleeding. This hemorrhage can occur in two ways, the first being within the brain tissue and the second occurring on the surface between the brain and the meninges. This type of stroke is more uncommon to occur among people (BALDIN, 2009)

Ischemic stroke occurs when there is obstruction or clogging of an artery, causing an impediment to the passage of oxygen to brain cells, which end up dying due to lack of nutrients. Ischemic stroke is the most common among the population, about 80% of cases are caused by a decrease in cerebral blood flow, causing the brain to deprive itself of glucose and oxygen that it needs, consequently impairing cell metabolism, causing it to cause injury and tissue death (O'SULLIVAN; SCHMITZ, 2004).

Cerebral metabolism changes when blood supply is interrupted for 30 seconds, due to hemoglobin's function as a carrier of nutrients. After 1 minute, neuronal function may stop, and 5 minutes after blood flow is stopped, anoxia begins a series of events that can lead to a cerebral infarction, if blood flow resumes quickly, damage can be reversible (SILVEIRA, 2010).

According to the Ministry of Health The main warning signs for any type of stroke are:

- Weakness or tingling in the face, arm or leg, especially on one side of the body;
- Mental confusion;
- Alteration of speech or understanding;
- Change in vision (in one or both eyes);
- Change in balance, coordination, dizziness or change in walking;
- Sudden, severe headache with no apparent cause

The Ministry of Health highlights several factors that corroborate the probability of occurrence of a stroke, either hemorrhagic or ischemic. The main causal factors of the diseases are:

- overweight;
- High cholesterol;
- Family history;
- Smoking;
- Obesity;
- Excessive use of alcohol;
- Sedentary lifestyle;
- Advanced age;
- Use of illicit drugs;

People with accident sequelae caused by stroke normally follow a rehabilitation routine and medical treatments according to the type and cause, in some cases there is surgical intervention, and later for physical therapy treatment which is an exhaustive search to obtain muscle mobility. It is recommended the practice of physical exercises to maintain health and quality of life (COELHO, 2008).

Physical exercise is all systematized or standardized physical activity with pre-established duration. Therefore, it has a specific duration of time, with movement sequences for different parts of the body and provides increased physical skills, such as flexibility, strength, resistance and among others. Physical exercise is an important ally for those who want to increase the health of the cardiovascular system, in addition to stimulating the immune system in the long term, which becomes stronger to fight diseases (COELHO, 2008).

Some studies such as Ulbricht (2019), recommends physical exercises for the rehabilitation of individuals who have had their motor capacity reduced, he highlights stretching of upper and lower limbs, balance exercises to work on the coordination of the gait step to later introduce the walk. This study also highlights bicycle, swimming, treadmill, bodybuilding and other exercises, always respecting the biological individuality of patients so that recovery evolves gradually.

Traditional hypotheses regarding deficits in voluntary movement adduce a lack of inhibitory control by the central nervous system from supraspinal centers over lower centers as the cause of hyperactive stretch reflexes. The underlying causes that are both neural and non-neural. Contributory factors for deficit in voluntary movement as originating centrally, peripherally, or both. People who demonstrate the deficit of voluntary movement may have different mechanisms contributing to their movement (CASTRO, 2005)

Touillet et al. (2010) points out that the main mission of these protocols will be to prove that the physical exercise program promotes short and long term benefits, enhancing social interaction and physical performance, in addition to considering it as a secondary prevention method and health promotion.

According to the American Heart Association, using the affected side of the body helps communication between the brain and the affected area. Physical exercise helps the patient to stimulate the brain to use motor skills. Exercising regularly there is an increase in the number of muscle fibers, promoting muscle growth and enhancing the strength of the patient. Chiyoda (2008), quotes some examples of exercises that can be developed by a professional in the field of Physical Education:

### **Shoulder Exercises**

- Shoulder flexion: Take a weight, support your arm straight and raise it, without flexing your elbow, over your head, then lower.
- Shoulder abduction. Grab a weight, hold your arm straight. Raise your arm to shoulder height. Return the arm to the starting position. Another option and sitting down, hold the stick with both hands stretched out in front of you. Raise both arms above your head.
- Lying on your back with your arms extended upwards. Raise your shoulders as if you are pushing up on the ceiling without lifting your head.

### **Exercises and Elbows**

- Elbow Extension: Lean forward slightly and hold your elbow behind your body. Lift the weight behind, keeping the elbow straight, then bend. Do 10 times and switch sides;
- Elbow flexion: Grab a weight and flex your elbow and then straighten it.
- Lie on your back with your arm up, securing your elbow with your other hand. Allow the weight of your forearm to slowly flex your elbow until you feel a stretch.
- Stand with arms extended downwards and thumb forward. Bend your elbow and hold this position for 5 seconds.

### **Arm Exercises/Rotation**

- External rotations: Hold an elastic band in your hands. Start the exercise with your elbows flexed at 90 degrees against your body. Open your arms by moving your hands to the sides.
- Internal Swivels: Tie the other end of the band to a doorknob. Then, keeping your elbows at 90 degrees, push the other end towards your abdomen.

**Wrist Exercises**

- Hold the weights in your hands, with your elbows bent at 90 degrees. Turn your palm up and down.
- With your palms facing down, hold a weight in each hand and bend your elbow to 90 degrees. Move the wrist up and down while keeping the elbow static.
- Hold the hand by bending the wrist down until it stretches.

**Knee Exercises**

- Lie on your back with one leg straight and the knee of the other leg bent. Raise the straight leg to the height of the other flexed one. Keep lying down and with an elastic band on your heel, raise your leg off the ground until it is fully stretched.

**Ankle Exercises**

- Sitting on a chair with your foot resting on the floor, raise your heel without taking your toes off the floor.
- Sitting on the ground with a band around your foot, pull the ball of your foot toward your body until it is stretched.

**Neck Exercises**

- Standing with the posture aligned, bend the neck forward touching the chin on the torso, sitting, look forward, bend the neck to one side.

**Spine Exercises**

- Stand with your arm over your head, lean to the right until you feel a stretch, then repeat on the other side.
- Lying on your back, pull your knee towards your chest, the other leg is stretched out, leaning against the floor.

Another study that addressed aerobic strength and resistance training was the study carried out by Nascimento, et al (2012), which in five months of strength and muscular resistance training, showed an increase in strength in the knee extensors, as well as aerobic training it also causes significant improvements in muscle strength in this type of population.

In this way, physical activity becomes a great alternative to recover both the motor functions of the muscles and the patient's self-esteem, providing him with leisure time and socialization with other people within his social life. (SILVA, 2014)

Aquatic activities have achieved a great rise as a means of rehabilitation, where there are countless beneficial effects provided by the liquid medium, such as: physiological effects on the vascular system, effects on soft tissues, effects on joints, providing an improvement in a short time and in a more efficient way. pleasurable for the patient due to the minimization of difficulties in executing movements (COSTA, 2002).

In the case of this study, we are interested in knowing more about how this process occurs in the group of people who have sequelae from strokes and in this particular aspect, the authors will highlight that the aquatic environment, if properly used, is capable of providing a stable environment for the active participation of the patient and improvement of functional ability.

Aquatic neuromotor rehabilitation is able to positively interfere with problems associated with ataxia such as weakness of proximal muscle groups, and it is believed that aquatic neuromotor rehabilitation can be used as a treatment for ataxia itself. Commonly described benefits of aquatic rehabilitation for brain-injured adults include tone reduction, contracture prevention, static and dynamic balance assistance, earlier and more effective strengthening, cardiovascular benefits, motivation, recreation, and socialization. (SILVA and LIMA, 2011)

The aquatic environment may be one of the few places where reciprocal movements can be performed safely. This is important for rehabilitating brain-injured patients because

encouraging these activities may decrease fast-twitch muscle fiber atrophy and possibly reverse effects of muscle atrophy.

It can be noted that most of the studies are related to the improvement of conditioning related to aerobic resistance and strength gains, these physical qualities play a fundamental role in the performance of daily activities of any human being.

## Results and Discussion

According to the researched articles, physical exercise proved to be beneficial for this population. According to the study carried out by Rosa, et al. (2018), where 12 weeks of progressive resistance exercises and 12 weeks of controlled exercises were performed, it was found that the total lean mass increased by decreasing the percentage of fat in the body.

## Final Considerations

In view of the surveys addressed, it is concluded that physical exercise supervised by a Physical Education professional, and always respecting the biological individuality of each patient, proved to be beneficial for this population.

It was possible to perceive how important aquatic rehabilitation programs are due to the function for the treatment of special groups due to the properties of water that provide benefits for the organism as well as the vascular physiological effects, effects on the joints, renal, cardiorespiratory, musculoskeletal system, among others. others, bringing improvements in quality of life.

The results demonstrate the effectiveness of exercise in gaining strength, resistance, flexibility and among other physical qualities that facilitated the performance of daily activities, in addition to improving mood, promoting a better quality of life for these patients. It is very important to carry out new studies that address the effectiveness of exercise both in its physical and psychological aspects, comparing a group that participates in the exercise program with those that do not do any physical activity.

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Received: 16/02/2024

Approved: 18/03/2024