

# Rehabilitation of Patients with Motor Sequelae Caused by Stroke-Vascular Accident in Times of COVID-19

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**Abstract:** Cerebrovascular Accidents (CVA) is the third cause of death in the world, people who suffer from these conditions experience changes in their lives that are manifested through motor, cognitive and sensory sequelae resulting from a stroke. Despite the isolation conditions caused by the COVID-19 pandemic throughout the world, Cuba was forced to design actions that responded to the rehabilitation of patients with different motor sequelae in the community context, so that without physical treatment increased and passed to sequelae of greater physical motor impact due to the time of immobility. The objective of the study is to design therapeutic actions for the rehabilitation of hemiparetic patients at home, maintaining the hygienic-sanitary measures established by Public Health in times of the COVID-19 pandemic, since the institutions that develop this treatment are closed. For the development, empirical and theoretical methods were applied, which allowed adapting the actions to the individualized treatment according to the state of disability. The results of the actions corroborated the self-validation and reincorporation into social life of three investigated patients, demonstrating the effectiveness of individualized work, associated pathologies and the work of community actors and the actions of the family.

**Keywords:** Motor Sequelae, Immobility, Stroke-Vascular Accident, Community Context

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## 1. Introduction

“The average life span of primitive man was twenty years; in ancient Greece and Rome, from about twenty-eight, in the 15th to 19th centuries around 40, life expectancy at the beginning of the 21st century increased to about 74 years”. [1] Age is a factor that tends to be the trigger for multiple diseases, notably non-communicable chronic diseases (NCDs). Among these, ischemic heart disease, cancer, diabetes mellitus and cerebrovascular accidents (CVA) prevail, the latter being the first cause of neurological invalidation. Vascular diseases are the third leading cause of death in the most developed countries. The World Health Organization (WHO) confirms that 600 million people in the world have some kind of limitation in their validation given the cognitive, sensory and motor sequelae left in most patients who survive a stroke or cerebral infarction. [2]

They are the leading cause of admission for neurological disorders, with a global annual incidence of around 800 cases per 100,000 inhabitants. In developed countries it is

estimated that 5% of the older population suffers from this condition in some way. They predominate mainly in people aged 50 years or more, increasing their incidence due to the increase in life expectancy [3].

Cuba is not exempt from this reality, since according to statistics from 2019, vascular diseases are also the third cause of death after traffic accidents and cancer.

The possibility of suffering a stroke before the age of 70 is about 20%, increasing its incidence due to the increase in life expectancy given current scientific advances, so its presence is looming with increasing force in the coming years. In the country there is a life expectancy in a progressive ascent, so the incidence of these diseases in its population does not escape, they constitute the main cause of hemiparetic syndrome since the lack of blood supply in an area of the brain causes tissue death in a few minutes due essentially to the lack of oxygen, this syndrome manifesting itself in the form of motor, sensory coordination disorders and trophism alterations.

About two years ago the world has been plagued by a virus that has involved many deaths of children, youth and adults without distinction of creeds or races. Cuba adopted the pertinent hygienic measures according to the treatment and prevention protocols, being the mandatory preventive isolation one of the actions of the strategy to avoid contagion by COVID-19, for that moment, one of these measures is the closure of Centers rehabilitation of the Ministry of Public Health and therapeutic areas of the National Institute of Sports, Physical Education and Recreation Inder at all levels. During this time, stroke has continued to occur in the adult community with motor, sensory and cognitive disabilities, which makes it difficult to transfer to these institutions to receive treatment in normal situations. What was raised above defines the following problem situation:

- 1) Insufficient time for the rehabilitation of patients with hemiparesis in the rehabilitation wards in pandemic conditions.
- 2) Poor performance in the community of Physical Culture professionals and physiotherapy technicians to treat motor sequelae (Hemiparesis) caused by (CVA) in pandemic conditions.

Based on the above, the following scientific problem is formulated: How to contribute to the rehabilitation of patients with hemiparesis from home in conditions of a COVID-19 pandemic.

To treat the shortcomings previously declared, the following objective is proposed: to design a physical therapeutic treatment to contribute to the rehabilitation of patients with hemiparesis from home in conditions of a COVID-19 pandemic. To solve the problem, the necessary sources were consulted, the After diagnosing the current state of a patient with hemiparesis according to the disabling parameters, the physical therapeutic treatment was designed to be carried out at home, taking into account the hygienic measures required by public health in the community, in addition to carrying out an assessment of the results obtained up to the filing date. Three hemiparetic patients constitute a sample of this study.

## 2. Material and Methods

### 2.1. *The Cerebrovascular Accidents and the Interaction of the Professional of the Therapeutic Physical Culture in the Motor Sequelae*

AVEs are temporary or permanent affectations of an area of the brain due to ischemia or hemorrhage, one or more cerebral blood vessels being affected by a pathological process in the quality or quantity of the blood that they provide. These cerebral vascular diseases are the most prevalent neurological disorders. Caused by some pathological process of the blood vessels. Quintana, defines it as: "(...) the clinical picture resulting from the temporary or permanent functional loss of any part of the Central Nervous System, generally of sudden installation, caused by the thrombotic, embolic occlusion or the rupture of an encephalic

artery" [3].

These damaged cells constitute the ischemic penumbra and can remain in this state for several hours. Not all cells in the affected territory die immediately, but there is a part that is at "risk of dying", and with proper treatment they can be saved. The course will depend on the intensity and location of the ischemia and the brain's ability to recover. When the blood supply to an area of the brain is suddenly interrupted by the rupture it is called a "hemorrhagic stroke"; when it is due to occlusion of an artery or blood vessel (by a thrombus) it is called "thrombotic cerebrovascular accident"; when it is due to occlusion (due to an embolus), "embolic stroke", and when it is due to both causes including "thromboembolic stroke". Brain cells die as they essentially stop receiving oxygen and glucose, which reaches them in this way. The aforementioned is based on what is stated by the authors [4].

In this process, another phenomenon called "ischemia" also usually occurs, as a consequence of the narrowing of the lumen of the vessels (stenosis) due to the accumulation of lipid atheromatous plaques, as well as blood clots in their walls, or due to the presence of arterial hypertension, which is characterized by reduced blood flow, which causes affectations, although to a lesser extent. Its appearance is known as "transient ischemic attack" (ATI) and presents symptoms similar to that of cerebrovascular accident, but gradually disappears without leaving noticeable motor deficits, and may last less than 24 hours. [5]

These opinions influence the interest of the researcher to find ways to influence the physical rehabilitation process in the greatest number of patients and to involve the patient in their own rehabilitation process. Basing itself fundamentally on the opinion of Davies, when he states that "there are patients who 5 years after suffering a stroke have recovered activity and improved functional ability. With informed therapy and diligent performance of an exercise program at home, the chances of a late recovery are much greater" [6].

What is known as "recurring AVE" also stands out. Approximately 25% of people who have suffered a cerebrovascular accident suffer another one again in a period of five years, deepening the incapacitation and even leading to death. The risk of having a recurrent stroke is greatest immediately after having one of these episodes, and decreases over time. It is estimated that approximately 3% of patients who suffer an AVE accident have a high probability of suffering another within 30 days of having suffered the first, and that a third of these phenomena usually take place within the first two years of have happened the first. [7].

Until recently, medicine has been able to do very little for affected people, but evolution has been very rapid and new and improved therapies are being developed every day, in such a way that, if there has been early treatment, people who have suffered an acute stroke (CVA) can leave it without disability or with very little, opinion is based on what was raised by Quintana, when he says that "(...) rehabilitation should start from when the patient is stable in the care unit intensive after 24 hours" [8].

In this same work, Quintana makes a brief analysis of the current situation of this disease in Cuba, in which he states the following “(...) a set of social changes has been carried out, which allowed satisfying health conditions, education, employment, cultural development and at the same time undertaking lines of technical scientific development that in some branches have placed it in a prominent place worldwide” [9].

As life expectancy increases, the risks for these diseases increase and as already explained, the population of Santiago de Cuba is aging, so that since the beginning of the 90s there has been a significant increase of the incidence, prevalence and mortality due to CVA.

In summary, (CVAs) constitute one of the health problems in the province, due to their high mortality. These diseases have been shown to be the third leading cause of death overall, second only to heart disease and malignant tumors. It is the leading cause of neurological death and the leading cause of non-traumatic disability. More than 50% of patients discharged for this cause are left with physical or mental sequelae.

As the world faces the COVID-19 pandemic and its prevalence in the elderly, it concludes with Piedra 2022, in how simply the elderly is in contracting this terrible disease after having suffered from a stroke. [10].

## **2.2. Physical Motor Characteristics of Patients with Hemiparesis**

Hemiparetic syndrome is a consequence of an AVE that affects specific areas of the brain from where voluntary movement is controlled. The patient loses the ability to mobilize the hemibody on the side opposite to the injury and this severely compromises their functional independence for activities of daily living. Muscle weakness is characteristic of hemiparesis caused by lesions affecting the nerve tissues of the spinal cord. Also brain damage can cause weakness. Stroke or cerebral infarction is the most common cause of hemiparesis, in fact muscle weakness is one of the first symptoms of stroke and the reason why people go to the doctor in the first place. Hemiparesis can be grouped into different types according to the causes of appearance according to Prades, these are classified into Hemiparesis on the right side, Hemiparesis on the left side, Infantile hemiparesis and Ataxia. [11]. It is essential to accurately define the pathophysiological mechanisms that link SARS-CoV-2 infection with the occurrence of stroke, in order to apply more specific treatments and avoid future complications. [12].

## **2.3. Rehabilitative Physical Treatment at Home for Patients with Motor Sequelae During COVID-19**

The treatment alternative has the characteristics of being able to be executed in a simple way and with a minimum of resources. This means that it can be applied using the conditions presented by the patients, the home and maintaining the hygienic sanitary measures of the patients

and the rehabilitator. For each of these exercises, the stages through which the patient passes are taken into account, setting specific objectives for each of them, closely related to each other, since the physical rehabilitation process is continuous.

Diagnosis of patients: This proposal of therapeutic physical exercises was applied to three patients representing 100% of the sample, all from the Santiago de Cuba municipality. Each of these patients is characterized below.

1. 64-year-old patient. Sex. M. Weight. 90kg. Size 178 cm. Race. Black Current occupation. College professor. Graduated in Physical Culture and ex-boxer. Primary pathology. Ischemic (CVA) (first time) Drugs. Atenolol and aspirin and sedentary lifestyle. Motor sequelae hemiparesis on the right side, with facial paralysis.
  - a) Psychological evaluation: it is seen to be depressed, it is collaborative with the actions of standing, sitting and walking with help.
  - b) Secondary pathology. Arterial hypertension (HTN), heart disease, pulmonary edema. Former smoker and drinks coffee and alcoholic beverages.

This patient suffered (CVA) on March 5, 2020, after 24 hours of the episode had elapsed and with the assurance that his vital signs were stable, he began to undergo rehabilitation treatment, at the time of the event he was diagnosed properly treated pneumonia. He was discharged on March 8, 2020, treatment begins at his home in March 2020 until July of the same year.

- c) Motor evaluation: lack of balance, flaccidity in both the upper and lower right limbs, low muscle tone, incoordination in movements, and poor lines with the right hand, in it, the right hand. He is an individual who practiced sports for many years, and by his profession he knows the benefits of physical exercise, so he is willing with the process and reflects satisfaction with each positive action.
  - d) Evaluation of speech therapy: speech disorders, loss of logic and repetition of words.
  - e) The socio-community environment: he lives with his wife and daughter who provide worthy attention to the patient, he is loved and respected by his co-workers and neighbors.
2. 74-year-old patient. Sex. M. Weight. 87kg. Size. 1 74 cm. Race. Black.
    - a) Current occupation. Retired from the MINFAR sector. Primary pathology. Ischemic AVE (first time) Sequelae. Hemiparesis (right) with facial paralysis. Secondary pathology. Arterial Hypertension (HTN). Consume cigarettes, coffee, and alcoholic beverages. Atenolol drug treatment.
    - b) This patient suffered CVA, on April 20, 2021, he began to undergo rehabilitation treatment at his home in May 2021. Psychological assessment: depression, speech disorder, and is not very cooperative with the actions of standing, sitting and walk.
    - c) Motor evaluation: balance disorder, flaccidity in the limbs, gait in the form of a scythe, poor lines, does

not hold any object, sedentary lifestyle.

- d) Evaluation of speech therapy: speech disorders and repetition of words and total loss at times.
  - e) Drug treatment. Atenolol.
  - f) Social community environment: he lives alone and sometimes receives help from friends and neighbors.
3. 52-year-old patient. Sex. F. Weight. 79kg. Size 154 cm. Race. Black Current occupation. Cleaning assistant of the Mill. Santiago de Cuba Primary pathology. Ischemic AVE (first time) Sequelae. Hemiparesis (Left side) Secondary pathology. Arterial hypertension (HT) Ingest coffee. Drugs. Alodipine.
- a) This patient suffered AVE, on April 20, 2021, after 24 hours of the episode had elapsed and with the certainty that his vital signs were stable, he was discharged and on August 2, 2021, treatment began in his address, after 4 months of suffering the sequel.
  - b) Psychological evaluation: depression, speech disorder, and it does not collaborate with the actions of standing, sitting and walking with help. He attended only one month to the rehabilitation area.
  - c) Motor evaluation: balance disorder, spasticity in upper and lower right limbs with low muscle tone, lack of coordination in movements, before not holding any object, sedentary lifestyle at the time of stroke, not seen as a collaborator.

Speech therapy assessment: speech disorders. Socio-community environment: she lives with her husband and sometimes receives social help from relatives.

The results confirm an excess risk of persistent and new sequelae after acute SARS-CoV-2 infection in adults aged 65 years and older. Apart from respiratory failure, dementia, and postviral fatigue, the sequelae resemble those of viral lower respiratory tract disease. [13].

The results obtained corroborate the possible consequences that Covid can cause in patients with STROKE in studies carried out by the Femeba Foundation [14].

To carry out the physical rehabilitation treatment at home under pandemic conditions, sources and medical guides from the area and from abroad were consulted, also maintaining the hygienic-sanitary conditions of the home for the patient and the rehabilitator. [15].

### 3. Results and Discussion

General objectives of therapeutic actions: improve self-validation in hemiparetic patients from home.

#### 3.1. Methodology and Materials Used

To implement the exercise proposal, an initial diagnosis was made, which was the one that showed the real limitations of the patients, the hand and knee strength were applied in a first test, a Dynamometry and Goniometry test was applied. They were not favorable because they reflected little hand strength, the degree of mobility of the knee joint and the elbow joint in the three patients, the results are shown in table 1.

**Table 1.** Results of the joint strength and mobility tests.

Pacientes	1	2	3
Hand dynamometry	6kp	5 kp	0kp
Knee Goniometry	20 degrees	20 degrees	10 degrees
Elbow Goniometry	0 degrees	0 degrees	0 degrees

Throughout this process of home rehabilitation, several easily accessible means were used that made work possible, these were the following:

Hair dryer, cloth ball, knob with water and sand, pillow, homemade washer, mirror, ladder, fence, bed, chair, balloon, bottle lids, rubber bands, ropes and all the space available at home.

#### 3.2. Methodology Used in the Treatment of Hemiparetic Patients from Home in Conditions of a COVID Pandemic

The beginning of a stage does not deny continuing working with activities that respond to the previous stage. The selected and described proposal takes into account the criteria of different authors as well as those considered by some existing physical exercise programs. The length of stay in each stage depends on the evolution of each patient. The time of each session is between and two hours, these were carried out in the afternoon session.

First stage of treatment: Stage of basic physical preparation.

The Specific objectives of the stage: fundamentally aimed at achieving that the patient improves the state in which it is received at this time, since they:

- 1) They walk with difficulty.
- 2) The affected arms do not have movements, the flaccidity is installed.
- 3) They do not lift the affected leg by itself.
- 4) They fail to hold and throw a ball.
- 5) They have little sensation to a stimulus on the affected side.
- 6) They are easily distracted.
- 7) They have language problems and facial paralysis.

##### *Actions to be developed in the first stage*

Exercises assisted by the teacher up to 30% of amplitude (flexion and extension) of the affected hemibody and the maximum possibilities of the healthy side, Therapeutic massage in healthy and affected limbs and heat techniques, exercises for the mouth, eyes, lips, facial massage, breathing exercises and posture correction.

*Second stage of treatment:* consolidation of motor responses

Specific objectives of the stage: to achieve that the patients improve through consolidation the state they have reached after the first stage of treatment has elapsed, since at this time patients are received with:

- 1) Low muscle tone.
- 2) Lack of balance.
- 3) Incoordination in movements.
- 4) Language problems.

Exercises to be carried out in the second stage: long walk

with and without help, assisted and resistive force exercises, therapeutic massage on the affected side, joint mobility, use of auxiliary means, speech therapy actions, facial massage, breathing exercises and posture correction.

*Third stage of treatment:* improvement or lifelong exercises

Specific objectives of the stage: improve the achievements in motor skills, strength, coordination, balance and exercise for the rest of life, in addition to exercising the language that is at this time one of the most persistent sequels later of the rehabilitation period. In general, patients walk independently at this stage, although with some movement, coordination and balance problems, so re-educating gait and posture will persist.

Exercises to develop in this stage 1

1. Tongue twisters.
2. Read aloud.
3. Talk in front of the mirror.
4. Breathing exercises.
5. Long walks.
6. joint mobility.
7. Strength and resistance exercises with weights.
8. Posture correction exercises.

### 3.3. Partial Assessment of the Application of Treatment at Home

The treatment applied and based on the use of physical exercise and massage as a fundamental means used by Therapeutic Physical Culture in the rehabilitation of motor sequelae caused by ICTUS, is considered positive according to the satisfactory evolution of patients one and two and the criteria of specialists (family doctor and specialist clinician of the care area), taking into account the duration of treatment at home (4 months) for a total of 80 sessions in patient one and 68 in patient two these patients continue to self-train and perform sound therapy, due to marked speech disorders. On the contrary, the treatment of patient three was continued for presenting spasticity in the lower and upper left limb. At the time of preparing the report presented, this patient is very independent.

After three months of the beginning of rehabilitation, it can be said that the patient has managed to overcome a large part of her limitations, goes up and down stairs independently and even manages to overcome several steps at the same time, her gait is coordinated and balanced, she has good coordination of arms and legs, the throws have acquired much more power as well as the blows on the pillow, having surpassed the results of the first two Dynamometry and Goniometry, the reaction to a stimulus, whether painful or not, is fast enough, during This time the distance of the walks has been increasing and the fatigue in its execution has decreased, although it has a gait in the form of a scythe, despite the positive evolution it has not been incorporated into working life.

In general, the results obtained are similar to other studies carried out previously, the families are very grateful for the reincorporation to the social life of the patients and the

independence they show, improves self-esteem, appreciates the treatment, dedication and tenderness with who was approached by one of his students and work partner, who will soon be joining his work performance in such difficult isolation situations, always maintaining hygienic measures, frequent hand washing and the mask by the technicians.

Based on the results, the PLI Investigative Labor Practice program for the graduate in Physical Culture is enriched, where it will solve existing problems in the community environment, supported by exercise tutors and professionals from Sports Combined. The impact of the social incorporation of these patients affects the economy and the university-community work is strengthened.

The Scientific methods used in the research that allowed to reach the realization of the scientific result were: Analysis-Synthesis, Induction-Deduction, Document review, measurement, Case Study, Document analysis, Observation and Interview.

The scientific novelty of this research work lies in the fact that despite the existence of a program for the care of people with disabilities and physical limitations, promoted by the Ministry of Public Health and Physical Culture, it is a treatment alternative that has been offered in the city of Santiago de Cuba to people with motor sequelae caused by stroke and who, due to various situations, cannot be transferred to rehabilitation centers and in this condition in times of COVID-19.

## 4. Conclusions

- 1) The theoretical referents analyzed allowed to reveal the influence of physical exercise in patients with hemiparesis and in special situations of isolation.
- 2) The diagnosis of the initial and final state of the patients demonstrated the satisfactory evolution of the rehabilitative treatment applied while maintaining sanitary hygienic measures in times of COVID.
- 3) The treatment provided at home to patients with hemiparesis was feasible for their reintegration into active life, since it is taken to the environment itself with affordable techniques, in addition to promoting greater participation of the family and the professional of the Physical Culture in the rehabilitation process in pandemic situations.

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