



## Review article

### Analysis of the Historical Background of the Rehabilitation Process of Hemiplegic Patients

Robiel Jesús Pozo Sánchez <sup>1\*</sup>  <https://orcid.org/0000-0002-5298-1870>

Jaqueline Medrano Montero <sup>2</sup>  <https://orcid.org/0000-0001-8631-5991>

Esteban Juan Pérez Hernández <sup>2</sup>  <https://orcid.org/0000-0002-4384-3150>

<sup>1</sup>Faculty of Physical Culture, the Oscar Lucero Moya University of Holguin, Cuba

<sup>2</sup>Ataxia Research and Rehabilitation Clinic, The University of Medical Sciences, Holguin, Cuba.

\*Correspondence: [pozo23@uho.edu.cu](mailto:pozo23@uho.edu.cu)

**Received:** 04/30/2022.

**Accepted:** 06/20/2022

**DOI:** <https://doi.org/10.34982/2223.1773.2022.V7.No3.012>

This document is published under a Creative Commons Attribution Non-Commercial and Share-Alike 4.0 International License



#### ABSTRACT

The rehabilitation of hemiplegic patients has turned into a significant medical-social problem, as this disease is the third cause of death in the industrial world, and the first cause of adult disability, due to the motor, sensitive, and cognitive after-effects found in most patients that survive the ictus. A previous theoretical study and diagnostic performed in this research based on interviews, surveys, official documentary review and observations of the treatment through physical rehabilitation of hemiplegic patients led a trend search for the rehabilitation of hemiplegic patients, with several different perspectives of such important processes.

**Keywords:** Syndrome; rehabilitation; hemiplegic patient.





## INTRODUCTION

Hemiplegia is a neurological syndrome that can have various causes, such as brain palsy, cranioencephalic or cerebral-vascular accident. It characterizes by a paralysis of the striated muscles of a hemibody, causing deep disability manifestations that act on the patient's psyche, and it can also be described as a lesion of the nervous system with the impossibility of moving one vertical half of the body actively and voluntarily. Several researchers give high relevance to this disease and have conducted studies to improve the social life of the patients who have undergone a cerebrovascular accident, Díaz, F., *et al.* (2011), Fernández Rego, FG. (2005) referred to cognitive therapeutic exercises for motor re-education of the paraplegic patient; Padilla Liando, U. (2015) referred to elements of hemiplegic movements using kinematic indicators. Moreover, there are medical statistics on the predominance of cerebrovascular diseases in middle and advanced ages, becoming the third cause of death in industrial countries, which affects around five percent of the population over 65, and more than 90% of the deaths of people over 50. Among the survivors, 50% or more are left with significant motor sequels; Abad García, *et al* (2013).

In Cuba, cerebral-vascular diseases constitute the third cause of death in all ages, following heart diseases and malign tumors. It is known that at the beginning of life, human motor development is very limited, being intimately associated with the development of the central nervous system (CNS); Aguilera, A., *et al.* (2011) y Aguilera, A., *et al.* (2010). The way hemiplegic patients walk varies considerably depending on the severity of the affection and the way of they use for compensation. The changes also involve the normal limb, as it must perform major adjustments when the affected limb does not work correctly. Two main motor problems are found in most hemiplegic patients: slow reaction of muscle groups (marked slowness when increasing and decreasing muscle tension), and the firm bond of muscle groups due to the synergies of primitive movements of the limb. The patient is unable to move their healthy foot in front of the affected foot. If the healthy foot were taken beyond the disabled one, the patient might lose their balance. Some people stop to control the imminent loss of balance, either during the offload or balancing of the pyrectic leg, which is known as the two-step intermittent walk. Another usual deviation among hemiplegic patients is the flexed and approximate posture of the arm. Its capacity to oscillate reciprocally is one of the components of ambulatory clumsiness. In the ontogeny of human locomotion, Hernández Corvo (1987) defined five functional stages: typical quadruped





(crawling), modified quadruped (atypical), claudicating irregular or support, unsupported claudicating bipedestation, stable bipedestation. At this last stage, humans begin to move their body functioning at neuromuscular levels, combining the muscle strength with the coordination of the different parts of the body. Physical rehabilitation moves toward prompt recovery of the patient and it is part of the medical assistance to improve the functional and psychological capacities of individuals, and to activate the compensation mechanisms, to lead an autonomous and dynamic life. Through it, the patient (depending on the degree of the lesion (or lesions) can aspire to achieve their main goal: motor control as part of the resources used in the rehabilitation of the hemiplegic patients, which usually relies on Therapeutic Physical Culture (CFT), with the physical exercise as the key element; Latacumba Fierro, S. C. (2007).

Aim: to analyze the behavior of physical rehabilitation of hemiplegic patients in Cuba along several stages.

## DEVELOPMENT

Considering that education is the ideal tool to transmit culture, in the field of instruction will be understood that the main efforts should be oriented to deep research on the roots of state-of-the-art pedagogic thinking. This information lets us know the historical background of education based on values, ideas, and convictions of identity; Colectivo de autores. (2007)

Resulting from the queries performed through the review of several sources, two main stages were found, in reference to the rehabilitation process's historical background in hemiplegic people, due to the existing differences among them in this particular area. First stage behavior of rehabilitation to hemiplegic people since 1900 to 1959; and second stage: behavior of rehabilitation to hemiplegic people from 1959 to present; Barroyeta Moreno, D. del V. (2019).

For a better understanding of the object of study, the following criteria were assumed; Cullell, M. E., *et al.* (2004):

- The conception of physical rehabilitation.
- The treatment of hemiplegia, particularly the walking of hemiplegic patients.

### **First stage: Behavior of rehabilitation to hemiplegic people since 1900 to 1959.**

The term rehabilitation began to be used in the early 1900s, meaning restoration, then it acquired the meaning of *good medical practice*.





Early in that century there was already an experience in work related to rehabilitation, using mainly massaging, and physical exercises for different conditions, in addition to different tools.

In London hospitals, the utilization of physical agents was encouraged to treat respiratory pathologies, marking the start of respiratory physio-therapeutics. Different European, Latin American, North American, and oriental schools (mainly in China and Japan) established the current bases of massage, with several outstanding therapeutic methods and techniques.

The practice of massage consisted of soft frictions, amassing and patting. Then there was a need for early motion in cases of fractures and sequels of several conditions.

In 1910, Whitney introduced diathermia by short wave and later, hyperthermia. In the same year, Esau and Schliephake began radiotherapy. In 1917, Paul Langevin built the first ultrasound equipment based on piezo electricity, observing the biological effects of these high-frequency vibrations.

After the First and Second World War, suffering several epidemics such as poliomyelitis, whose fractures were abundant in a large number of injured and disabled patients. Little by little, the world medical class began to think about the creation of a professional corpus completely dedicated to the study and practice of physical therapeutics. It was the official ground for the creation of the physio-therapist corps worldwide, and its professionalization and development, having physio-therapy access to the variety of academic studies.

Following the break out of the two big world wars, physical exercise sessions increased for rehabilitation in military hospitals in the contending countries and the people who were left disabled and with physical limitations.

In the United States, W. G. Wright developed kines-therapeutic techniques, especially to train paraplegic people, to walk on crutches, using the upper limbs. C. L. Lowman developed hydro-kinesiotherapy as a term and a method.

In Germany, the attitude toward exercise changed into greater importance to relaxation. That way, every therapeutic program was required to include relaxation exercises.

Based on the concepts of enervation and reciprocal inhibition, Sherrington introduced the normal and pathological reflexes in exercise-base therapies. Herman Kabat used the extension, flexion, and tone extension and named it self-receptive facilitation.

Regarding the therapeutic exercises, Thomas De Lorme thought about a method of systemic dosage for the effort "progressive resistance exercises", which was quickly





and widely accepted. The most revolutionary measures in therapeutic mobilization along this century was the early mobilization of patients after a major surgery, suggested by Leithauser Foguet, O. C. et al. (1990).

Upon the Great Socialist Revolution of October, the conditions were created for multilateral development of spiritual and physical capacities of humans, and the real possibilities for the creation of a therapeutic physical culture scientifically recognized that serves the people's interests. In Cuba, around 1948, the Swedish gymnast and the Danish system, with numerous followers, were only accessed by the well-to-do.

The information collected through the documentary review revealed that the archives and other written sources did not offer sufficient data on the existence of attention to physical rehabilitation and the care of patients' walk, who suffered hemiplegic affections or any development in this direction, to which people could have direct access somehow. It unveiled the lack of hints that reveal the social or individual concern of personalities or medical or sports institutions from the state during that stage, that took responsibility for the rehabilitation of people. So, considering that healthcare and sports institutions always respond to class interests, this stage evidenced the absence of care for the poor people who had any conditions or disabilities.

Although different countries achieved significant advances in rehabilitation of people with different pathologies, it did not mean that the population could access it, except in the Soviet Union. In the capitalist countries today, physical medicine has a commercial character, resulting from the individualistic and competitive form of medical practice in general.

In Cuba, before 1959, healthcare and physical rehabilitation was a reflection of the existing conditions; they represented the shortages and concerns by the then governments, being marginalized.

Therefore, it can be said that in Cuba organized, planned and systematic care involving physical rehabilitation began after 1959, with the triumph of the Cuban revolution; Yordi García, M. (2004)..

### **Second stage Behavior of rehabilitation to hemiplegic people after 1959 to present**

The changes operated in Cuba in 1959 favored the rehabilitation possibilities of the disable extraordinarily, integrating them into society broadly. In that sense, the resources allocated by the revolution to favor the affected people, the improvements of education of the people, the feelings of human solidarity, the development of healthcare systems, education, and sports to all without exclusions of the disabled, has widened the social engagement of the disabled.





The therapeutical areas of physical culture began in 1982, in two municipalities of the then Havana City province. Upon implementation and expansion, physical rehabilitation in Cuba spread out and embraced crowds. It opened new job opportunities that responds to a great need of the population, with a content and purpose that generated immense development prospects.

Hence, in Cuba, new therapeutic techniques and procedures were used for the first time, using physical exercises and other methods of physical medicine and rehabilitation for the treatment of neurological and cerebrovascular conditions, which combined into different stages of rehabilitation, have contributed to the reincorporation of these people to society; Chirino, E. C., & Suárez, D. C. (2008).

One of the most significant programs today is the one related to the care of people who have suffered some sort of neurological accident, especially hemiplegia, the third cause of death and disability; Estévez Perera, A., *et al.* (2012).

Age is the most frequent risk factor in cerebrovascular diseases, also called neurological diseases, doubling their incidence every ten years, after 55. The sick patients who have suffered some sort of accident like this, according to the bibliography, have 7%-10% risk of suffering another episode. The rehabilitation of patients with neurological conditions (Sentmanat, 1998), must consider several treatments through which a disable person has the mental, physical, and occupational possibilities to perform as normal as possible in their social setting. The therapeutical physical culture aims to achieve the recovery of the functional possibilities of the affected people, taking a relevant position to recovering the everyday activities. To evaluate a neurologically affected person, different tests can be used today, which offer a panorama of the patient from different points of view. One of the aspects to consider during the initial evaluation is the movement level achieved. Several methods are used for the analysis of walking in people with muscle conditions, becoming valuable clinical tools to determine the nature and severity of the disease. Walking analysis requires thorough knowledge of normal walking to get significant information about the patient, by carefully studying their normal walking patterns; Davies, P. M. (2003).

Among the most commonly used means are the footprints, which let us know the length of the steps, the width and base of the walk, its symmetry, etc. The photographic method offers more accurate data of movement, including video recordings and electro-goneometry. Dynamo-graphic platforms have also been used to measure strength, along with speedometers, and tension meters.

Cuba is a world leader in this area. It hosts an international center for neurological restoration (CIREN), a pioneer of a neurological restoration program that rests on





multifactorial and intensive neuro-rehabilitation, restorative surgery, and advanced pharmaco-therapy.

Today, one of the most commonly used tests has been described by Sentmanat (2003) in his work "back to life". He named it Integrated Psycho-Motor Evaluation (EIP), at CIREN. Overall, it includes, different sets of tests that aim to quantify and contrast the efficiency coefficients to estimate the normal and pathological patterns of patients. It enables knowing the motor development, including the application of a test to analyze the dynamics of walking. It is divided into two subtests, one measures the step frequency in 10 meters, the other measures step distance.

In the first subset, the subject stands with their feet in parallel position, behind a line marked on the floor. The patient moves at the examiner's sign (depending on the patient's possibilities), to the final line ten meters away. The number of steps is recorded along with the duration of the action.

The other subset has the barefoot subject introduce the feet in the talc deposit on the walk platform. At the examiner's sign, the patient walks at a normal pace (depending on their possibilities), on the black color surface. The prints on the sand are measured at three steps, having the heel of the first foot that converges with a perpendicular line drawn as a reference, from one of the edges of the platform and a similar point of the following foot. The three measurements are recorded and averaged. This value stays as the record of the length average of the subject's steps. Sentmanat (2003) (2).

Few data are recorded, which do not offer a more detailed characterization of the action in patients with a condition of hemiplegia.

In the two stages, the authors noted that they can perform a large number of physical therapeutic exercises, depending on the knowledge and experience of the therapist, the creativity, and the means available in the facility, though it is not recommended to conduct tests that characterize and evaluate these patients' walking.

However, Navarro and Arencibia (2006), Aquiles Cruz, R. (2006); analyzed the articulatory angle of the knee of the affected limb in a case study of a hemiplegic patient, recording the action on video, processing the images with the movement analysis system (SAM), establishing different stages for efficient rehabilitation based on the data collected from the tests.

Today, the rehabilitation centers in Cuba are located in several different communities. The rehabilitation work on patient walk is assumed from an initial analysis of the action, as referred to in the book of Kinesiology (2003), in which the patient with their bare legs is asked to take five steps at least.







Using observation based on visual perception, five of the seven aspects to assess are analyzed; the other two are evaluated through direct measurements of the step length and the width of the base.

Then, the muscles are strengthened, the different positions of the body are maintained, and balance is attended as well, thus establishing the strategy of the physical exercises to do.

## CONCLUSIONS

As observed, these exams also fail to provide a deeper characterization of the walking action by patients, so, if deeper analysis is made a more effective work strategy can be achieved by the therapist. Working to improve human health is a responsible and encouraging activity, particularly in an area as broad as the therapeutic physical culture. The ties between the Ministry of Public Health (MINSAP 2019) and the National Sports, Physical Education, and Recreation Institute (INDER) have produced a great repercussion in society, with the ensuing result of high satisfaction levels of the people assisted.

Therapeutic physical culture comprises a numerous group of programs which technicians not only provide attention to the disabled, but also care for pregnant women, lactating mothers, hypertensive patients, workplaces through gymnastic on the job, housekeepers, elders, and others.

## BIBLIOGRAPHIC REFERENCES

- Abad García, I., Villarroja Aparicio, M. A., & Campos Sanz, A. (2013). *Tratamiento fisioterápico de un caso de hemiplejia mediante el método Bobath*. Universidad de Zaragoza.
- Aguilera, A., Aguilar, J., & Subero, A. (2011). Aplicación de apoyo al diagnóstico en marcha patológica mediante análisis cinemático. *Universidad, Ciencia y Tecnología*, 15(58), 35–42.  
[http://ve.scielo.org/scielo.php?script=sci\\_abstract&pid=S1316-48212011000100006&lng=es&nrm=iso&tlng=es](http://ve.scielo.org/scielo.php?script=sci_abstract&pid=S1316-48212011000100006&lng=es&nrm=iso&tlng=es)
- Aguilera, A. I., Cala, L. D., & Subero, A. R. (2010). Modelo basado en metaclasificadores para diagnóstico en marcha patológica mediante análisis cinético. *Revista INGENIERÍA UC*, 17(2), 7–16.  
<https://www.redalyc.org/articulo.oa?id=70721885002>
- Alejos Rodríguez, J. (2011). *Efecto rehabilitador del ejercicio terapéutico cognoscitivo*







- en la mano hemipléjica del paciente adulto del Centro Médico Naval Santiago Távora, noviembre 2009—Marzo 2010* [Título profesional de Licenciado en Tecnología Médica, UNIVERSIDAD NACIONAL MAYOR DE SAN MARCOS]. <https://core.ac.uk/download/pdf/323351306.pdf>
- Aquiles Cruz, R. (2006). *Psicología, Gerontología y Geriátrica*. Editorial: Científico Técnico. [http://tendenciasenmedicina.com/Imagenes/imagenes49/art\\_08.pdf](http://tendenciasenmedicina.com/Imagenes/imagenes49/art_08.pdf)
- Barroyeta Moreno, D. del V. (2019). *Tratamiento neurocognitivo y rehabilitación en paciente hemipléjico* [Universidad Inca Garcilaso de la Vega, Repositorio Institucional - UIGV]. <http://repositorio.uigv.edu.pe/handle/20.500.11818/3980>
- Chirino, E. C., & Suárez, D. C. (2008). Descripción clínica-imagenológica y cognitiva en pacientes con enfermedad cerebrovascular aguda en atención secundaria. *Medimay*, 15(3), Art. 3. <http://revcmhabana.sld.cu/index.php/rcmh/article/view/431>
- Colectivo de autores. (2007). . *Material básico de la Maestría en Ciencias de la Educación, Módulo I, II y III*. (Primera parte). Editorial Pueblo y Educación.
- Cuba. Ministerio de Salud Pública. (2019). Anuario Estadístico Nacional 2018. *La Habana: MINSAP*, 29–34. [http://files.sld.cu/dne/files/20197/05/Anuario\\_Estad%C3%ADstico\\_de\\_Salud\\_e\\_2019\\_edici%C3%B3n\\_2019.pdf](http://files.sld.cu/dne/files/20197/05/Anuario_Estad%C3%ADstico_de_Salud_e_2019_edici%C3%B3n_2019.pdf)
- Cullell, M. E., Mendoza, M. A., & Terry, C. G. (2004). *La investigación científica en la actividad física: Su metodología*. Editorial Deportes.
- Davies, P. M. (2003). *Tratamiento Paciente Con Hemiplejia*. Ed. Médica Panamericana. [https://books.google.com.cu/books/about/Tratamiento\\_Paciente\\_Con\\_Hemiplejia.html?id=CU8oIU1fgkC&source=kp\\_book\\_description&redir\\_esc=y](https://books.google.com.cu/books/about/Tratamiento_Paciente_Con_Hemiplejia.html?id=CU8oIU1fgkC&source=kp_book_description&redir_esc=y)
- Díaz, F., Cano, J., Vázquez, P., & Gil, A. (s/f). *Enfermedad cerebrovascular*. Medicine.
- Estévez Perera, A., Estévez Perera, A., Coll Costa, J. de L., & Hardy Martínez, Y. (2012). Grado de discapacidad en pacientes hemipléjicos del “Policlínico Docente Universitario del Cerro”. *Revista Cubana de Medicina General Integral*, 28(4), 682–693. [http://scielo.sld.cu/scielo.php?script=sci\\_abstract&pid=S0864-21252012000400011&lng=es&nrm=iso&tlng=es](http://scielo.sld.cu/scielo.php?script=sci_abstract&pid=S0864-21252012000400011&lng=es&nrm=iso&tlng=es)
- Foguet, O. C., & Balcells, M. C. (1990). *1001 ejercicios y juegos de recreación*. Paidotribo. <https://dialnet.unirioja.es/servlet/libro?codigo=177760>





- Latacumba Fierro, S. C., & Bautista Sandoval, M. F. (2007). *Facilitación del mecanismo de control postural normal en pacientes con hemiplejía partiendo del enfoque de bobath que asisten al hospital San Vicente de Paúl en el periodo abril a septiembre del 2012* [BachelorThesis]. <http://repositorio.utn.edu.ec/handle/123456789/2707>
- Yordi García, M. (2004). *El trabajo comunitario: Alternativa cubana para el desarrollo social*. Centro de Posgrado Internacional Carretera Circunvalación. [https://www.researchgate.net/publication/332528876\\_El\\_trabajo\\_comunitario\\_alternativa\\_cubana\\_para\\_el\\_desarrollo\\_social](https://www.researchgate.net/publication/332528876_El_trabajo_comunitario_alternativa_cubana_para_el_desarrollo_social)

**Conflict of interest statement:**

The authors declare the are no conflicts of interests whatsoever.

**Author contribution statement:**

The authors have taken part in the redaction of the manuscripts and the analysis of documents.

