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# FUNCTION OF THE UPPER MEMBER IN STROKE

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***Abstract:*** *Modern physical therapy is based on the idea that function governs the organ. This aspect can explain why the main activity of the hand is gripping and grasping and the main function of the foot is walking. The upper limbs use the movement in an open kinematic chain and have a very large representation at the central level, while the lower limbs work in a closed kinematic chain. We continue to face limitations in the recovery and interdisciplinary recovery of upper limb function in stroke, even though we currently have sufficient scientific evidence and therapeutic ways to stimulate healing. The research aims to identify whether a person suffering from an ischemic stroke can change the function of the affected upper limb three months after the accident by starting or continuing the recovery program until the patient leaves the acute phase.*

***Key words:*** *kinetoterapy exercise, stroke, upper limb function, kinetotherapy*

## 1. Introduction

Recovery of the upper limb at the functional level is critical. The rate of recovery of the upper limb in stroke functionally varies between 5% [5-6]. The current recommendations argue that we need to focus more than ever on evidence-based practice for effectiveness, efficiency and accountability, and early mobilization reduces recovery time.[8].

Only 20% of patients who suffered a stroke and were in the flaccid stage in week 2, recovered their hand functionally at full capacity. If a patient, one month after the stroke, does not have a measurable grip, the prognosis of recovery from a functional point of view is poor.

## 2. Disruption of Upper Limb function - Scientific evidence

Rehabilitation of movement in spastic hemiparetic patients depends on knowledge of the basic mechanisms of movement deficits:

- In a clinical trial conducted in 1989, decreased motor impulse or paresis is important following a stroke [2].
- Motor recovery after stroke is associated with decreased neural activity and cerebral reorganization [3].
- The amplitude of the movement, the time in which a movement was performed

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and the interarticular coordination may suffer [9].

• In 1993, it was shown that parietal stroke can cause different sensory syndromes, depending on the topography of the lesion. Sensory deficiencies can be monosymptomatic, but can never be present in all body segments (face, upper limb, lower limb, torso) [1].

• On a group of subjects who suffered an ischemic stroke, the activity of three intrinsic muscles was recorded, in the flexion / extension and abduction / adduction movements at the level of the fingers. The authors correlated the decrease in selectivity with a decreased hand function [7].

• Although tone disturbance appears to contribute to disability, it was observed in 19% of patients investigated 3 months after stroke. Severe disabilities have been observed in both patients with and without tone disorders.

Spasticity after a stroke occurs in approximately 30% of patients. However, the mechanisms underlying this disorder are not well understood. Pharmacological or non-pharmacological treatments have not yet been shown to have an influence on spasticity, but imaging can help predict the onset and could provide insight into its neurological basis [13].

### 2.1. Motor analysis - Scientific evidence

Following a systematic review in 2009, the authors did not have sufficient evidence to support proximal to distal recovery [11] .

There is evidence that the glenohumeral weakness of the abductors, flexors, external rotators and supinators in the radio-ulnar joint affects the grip [12].

Weakness of the radio-carpal muscles and fingers affects the handling of objects [4].

To identify functional abilities in children with cerebral palsy, a comparative study was performed. Thus, 9 hemiparetic children were compared with 12 kindergarten children, in a concrete task and in an abstract task. In kindergarten children, no differences were identified between the two tasks, however, hemiparetic children performed a significantly higher range of motion in the concrete task. It was concluded that patients do better in concrete tasks, which have a well-defined purpose, using an object, compared to abstract tasks, without an object.

Hyperactive reflexes, associated reactions and co-contraction do not directly influence activities.

Increased reflexes and disturbances of tone respond positively in specific tasks and training.

## 3. Catching and Grabbing in the Stroke

In 2017, the foundations were laid for grasping and grasping and certain key elements were identified:

• Target location (coordinated eye-hand movement);

• Grabbing (transporting and positioning the hand in the desired place);

• Grip (includes tightening and release);

• Handling skills [16].

### 3.1. Shoulder-elbow

Hemiparetic subjects have movement deficits, including weakness, spasticity, and inability to isolate movement in one or more joints. Voluntary attempts to move a single joint often lead to excessive movements in adjacent joints.

Some authors have tried to identify whether the inability to separate joint movements affects motor function. It was concluded that weakness and decreased

muscle activity influence grip [15].

Other reasons why the grip is affected:

- Abnormal synergy between the muscles of the scapula-humeral joint and the elbow, thus limiting the range of motion;
- Disruption of articular coordination;
- Poor coordination between grip and grip.

### 3.2. Hand

The grab deficit includes:

• Increased tone in the flexors of the fingers;

• Disruption of voluntary contraction of the flexion and extension of the fingers;

• Inability to independently contract muscle groups with effects in agonistic co-activation and reduced range of motion;

Test that can be used in the functional assessment of the upper limb:

• Frenchay Arm Test: Hand-skills

## 4. Recovery after Stroke

In most cases, recovery from stroke in physical therapy involves a thorough initial assessment, establishing a prognosis and applying treatment. Each therapeutic intervention involves the identification of specific recovery goals, established by combining the prognosis with the patient's goals. Modern physical therapy has sufficient scientific evidence to support the effectiveness of the therapeutic act in all three stages of stroke: acute, subacute and chronic. The recovery program aims at the functional recovery of patients and no longer works on the idea of complete recovery.

The objectives of modern physiotherapy in upper limb recovery:

• Care, assistance and protection;

• Inhibition and mobility;

• Posture;

• Integration of movement and possible activities.

### 4.1. Upper limb management after a stroke

Upper limb function is frequently reduced after a stroke, limiting the patient's ability to perform the tasks of daily living. Unfortunately, a large number of people never return to normal function. However, many therapeutic techniques have been discovered that have been shown to be effective and could provide significant gains.

Characteristics of the training plan:

• To be full of meaning;

• Adapted to the patient's needs;

• Repetitive;

• Progressive;

• Through specific tasks.

### 4.2. Upper limb posture

It must be borne in mind that after an accident, the brain establishes a new body plan and needs a new appointment. Proper positioning is important at rest and during functional activities and has a role in maintaining and forming the complete function of the hand, without pain and mobility on the full range of motion possible. Hygiene after a stroke is essential.

Posture can be done on a chair, on the table or in bed, by:

- Variations in movement and body positions;
- Active position, sitting;
- The shoulder under the elbow;
- Postural variations in the patient's visual field;
- Hemiplegic upper limb: flexion of the scapula-humeral joint; elbow outstretched; hand support with palm up;
- The unaffected upper limb is pillow support;

– Dorsal support by pillow;
– The lower limbs are bent at the hips and a pillow is placed between the knees.

### 4.3. Prevention of pain and subluxation on the hemiplegic side

Joint protection strategies should be applied in the early or flaccid stage of recovery to prevent or minimize pain and injury. These include:

- Posture and support of the arm during rest
- Protecting and supporting the arm during mobilization; avoid pulling on the affected arm
- Protecting and supporting the arm while using the wheelchair; Example: using a pillow
- The use of orthoses or bandages should be avoided, except for the flaccid stage because it reduces the functional capacity, can contribute to the formation of contractures and influences the body image.
- Do not use pulleys above the head
- Education for proper limb care
- The shoulder must not be moved more than 90 degrees in flexion until the shoulder blade can make the lateral tilting movement and the shoulder the external rotation
- Patient positioning is essential to prevent complications.

## 5. Evaluation Test and Kinetotherapeutic Treatment Plan

**Evaluation test**

The frenchay arm test (FAT)

- Position the ruler and hold it in the desired position, while drawing a line with a pencil held in the other hand
- Grab a cylinder (12 mm in diameter, 5 cm long), place it on the side about 15 cm from the edge of the table, lift it about 30 cm and put it back
- Pick up a glass and a half full of water that is positioned about 15-30 cm from the edge of the table, drink some water and put it back
- Remove, remove 15-30 cm and replace a cylinder with a diameter of 10 mm and a length of 15 cm by means of a clothes hook.
- Comb hair (or imitate); from up to down; back and down; on each side of the head [17].

For the FAT test, one point is awarded for each task solved; Maximum score: 5;

Physical exercise and treatment is very important in achieving the expected effect [10-14]. It will be carried out in a single stage because all means will be addressed from the first week of the research and will be divided into three main directions:

1. Catching;
2. Grabbing;
3. Function-focused training;

Patients will perform two sessions per week under the guidance of a moving specialist, and another three sessions will be conducted individually at home. The time of a meeting can vary between 45 and 60 minutes. Pauses will always be dictated by the patient, and the value can be between 15 and 60 seconds.

**Catching**

- Pi: sitting, transporting and positioning the hand to grab an object from the ground, return to Pi. Dosage: 3 sets with 8 active repetitions.

- Pi: sitting, transporting and positioning the hand to grab an object from the left side, return to Pi. Dosage: 2 sets with 8 active repetitions and 2 sets with 12 passive-active repetitions.

**The grip**

- Pi: seated, radio-carpal preposition in dorsiflexion, with the phalanges in a slight

flexion, grab in the hook, return to Pi. Dosage: 3 sets with 10 repetitions.

- Pi: seated, radio-carpal preposition in dorsiflexion, with the phalanges in a slight flexion, grasping by police adduction, return to Pi. Dosage: 3 sets with 10 repetitions

The clamping component is removed from the equation at each exercise by passive mobilization. The shape and size of objects is constantly changing;

**Function-focused training**

- Pi: sitting, turning on the light by means of a switch, return to Pi.
- Pi: seated, opening a drawer, return to Pi.
- Pi: sitting, picking up and using the phone, returning to Pi.

The dosage is not mentioned because it differs from day to day - less than 3 series, with a minimum number of 15 repetitions.

Following the application of the recovery program, the results are highlighted by evaluating the patient at the beginning, end and during recovery, which are finally centralized in order to more easily observe the patient's progress during the application of physical therapy.

*The frenchay arm test (FAT*) Table 1

| | Patient 1 | | Patient 2 | |
|---|---|---|---|---|
| | Initial | Final | Initial | Final |
| The frenchay arm test(FAT) | 0 | 1 | 1 | 1 |
| | 0 | 0 | 1 | 1 |
| | 0 | 0 | 1 | 1 |
| | 0 | 0 | 0 | 0 |
| | 0 | 0 | 1 | 1 |
| Total The frenchay arm test( FAT): | 0/5 | 1/5 | 4/5 | 4/5 |

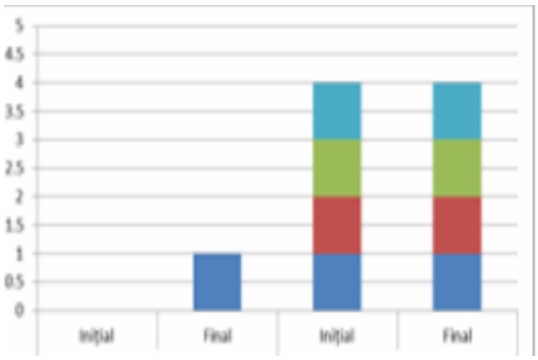


Fig. 1. *Test examination data (FAT)*

## 6. Discussion

It can be seen from the FAT test that the values of motor function after the three months of treatment are approximately identical, even if it was insistently tried to stimulate it. The motor baggage existing three months after the stroke remains unchanged until the end of the study. From a personal point of view, there is a possibility that motor function can no longer be influenced by kinetic means even after six months.

A kinetic program applied for three months to patients who have suffered an ischemic stroke between three and six months and who are between 71 and 80 years old, can influence the functional recovery of the upper limb, especially in the movements. existing and at first sight does not seem to stimulate the emergence of new movement.

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