

# THE IMPORTANCE OF KINETOTHERAPY IN MULTIPLE SCLEROSIS

Florentina NECHITA<sup>1</sup>

**Abstract:** *Multiple sclerosis is an inflammatory demyelinating disease of the central nervous system. Most of the lesions are at the level of the white matter or the junction of the white matter with the gray matter, with the periventricular region as the preferred topography. Multiple sclerosis (MS) is the leading cause of disability in young adults. The purpose of the research is based on the selection of kinetotherapeutic means and methods corresponding to multiple sclerosis, as well as the design of an individualized recovery program, so that patients who have suffered from such conditions, recover, adapt as much as possible from a somatoscopic point of view and functional. With the help of the elaborated program, the goal is to re-educate the balance and improve the ability to exercise, by restoring self-confidence, raising the patient's morale in order to reduce certain complications of this condition.*

**Key words:** *multiple sclerosis; kinetic exercises; individualized recovery program*

## 1. Introduction

Multiple sclerosis is a chronic disease that is associated with a variety of multiple sclerosis specific symptoms. Many of these symptoms have a negative impact on health-related quality of life [6].

This disease is an inflammatory demyelinating disease of the central nervous system. Most of the lesions are at the level of the white matter or the junction of the white matter with the gray matter, with the periventricular region as the preferred topography. It is a chronic

immune-mediated disease of the central nervous system that develops in young adults with a complex genetic predisposition [3]. The number of MS patients in the world is 1.1-2.5 million with 10,000 new cases diagnosed per year. Affecting adults between 20-45 years of age, this disease requires the application of sophisticated research methods. In recent years, more and more frequently, cases of detection of lesions of the peripheral nervous system in patients with multiple sclerosis have been reported during the clinical and electrophysiological examination [5].

---

<sup>1</sup> Department of Physical Education and Special Motor Skills, *Transilvania* University of Braşov.

Multiple sclerosis has several forms:

- *Relapsing-remitting multiple sclerosis* - characterized by flare-ups (sudden and strong manifestation of the disease) followed by complete or incomplete recovery. Some cases may have no clinical recovery at all. The relapsing-remitting form is the most common form of multiple sclerosis (60-70% of cases).

- *Secondary progressive multiple sclerosis* - characterized by partial recovery after relapse and continuous progression (advancement of the disease), interrupted or not by relapse, occasionally with periods of stagnation. This form is usually reached after 10 years (on average) of the evolution of the recurrent-remitting disease in the absence of an immunomodulatory treatment.

- *Primary progressive multiple sclerosis* - characterized by continuous progression from the beginning, without relapses, occasionally with plateau phases. It's a form that affects the spinal cord more severely, right from the start.

Progressive multiple sclerosis with recurrences – continuous progression from the onset, but with acute episodes of worsening manifestations, with or without complete recovery [9].

### 1.1. Triggers of multiple sclerosis

The cause of multiple sclerosis is unknown, but it is thought to be the result of a combination of environmental factors, such as infectious agents, and genetic factors:

- *Immune system:*

As an immune-mediated disease, the immune system malfunctions and attacks the central nervous system.

- *Genetics:*

Genetically there is a chance of

developing MS. Thus, the chance of getting the disease is estimated at about 2.5 to 5% having an autoimmune response being triggered when they encounter these agents.

- *Infections:*

Viruses cause inflammation and a breakdown of myelin. Therefore, it is possible for a virus to trigger multiple sclerosis.

### 1.2. The symptoms of multiple sclerosis

Symptoms management in multiple sclerosis is an integral part of its care. Accurate assessment and addressing the different symptoms provides increased quality of life among patients with multiple sclerosis [1].

People suffering from multiple sclerosis experience various symptoms that, in some cases, prevent them from leading a normal life.

The symptoms of multiple sclerosis can be grouped under several forms. A classification divides symptoms into primary, secondary and tertiary:

- *Primary symptoms:*

The primary symptoms are those that are triggered as a result of the demyelination process, whereby the myelin sheath that covers the axons of neurons in the brain is damaged. Myelin allows the transmission of electrical impulses from one nerve cell to another, so that when it is destroyed, neurological disorders appear.

Primary symptoms of multiple sclerosis include:

– the feeling of body weakness;

– sensory losses;

– inability to control movements muscles (ataxia) [8].

- *Secondary symptoms:*

They will appear as a result of urinary retention, one of the effects of neurological problems, consisting in the situation where a person cannot empty his bladder completely or voluntarily.

- *Tertiary symptoms:*

Because of the symptoms it has, multiple sclerosis affects the patient not only physically, but also socially and psychologically. Over time, as the disease progresses and the manifestations become more frequent and difficult to control, there is a risk that the sufferer will enter reactive depression or resort to social isolation.

The symptoms of multiple sclerosis can also be grouped according to the frequency with which they appear, figure 1, as follows:

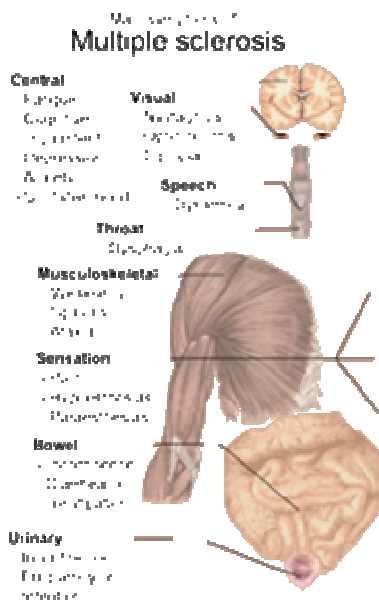


Fig. 1. *Main symptoms of multiple sclerosis [10]*

- frequent: fatigue, weakness, walking problems and spasticity, difficulties in

maintaining balance, depression, sensory loss;

- less common: speech problems;

- rare: convulsions, paralysis, hearing loss [10].

## 2. The role of physical therapy and other therapies used to treat, slow, and improve multiple sclerosis

Symptomatic and recuperative treatment has the general aim of improving the quality of life of patients with multiple sclerosis, while maintaining their social integration as long as possible.

It is adapted according to the clinical stage of the disease and the degree of disability characteristic of each patient and addresses each clinical aspect of the disease differently: motor disability, sphincter dysfunction, communication difficulties, cognitive impairment, emotional dysfunctions, etc.

The objectives of these measures are: preventing complications of the disease, reducing disability and limiting the patient's dependence by optimizing the use of remaining physical and psychological resources [7].

Physical therapy aims to maintain postural stability, preserve and improve motility through regular medical physical culture exercises, prevent contracts, maintain correct postures, correct use of orthoses, canes, etc., and respiratory gymnastics.

This has a very important role in improving the quality of life of patients diagnosed with multiple sclerosis.

The physical therapy specialist's assessment takes into account the patient's health, joint mobility, muscle strength, coordination and distributed attention. Each physical therapy program must be individualized and take into account the patient's age, gender and

degree of dependence.

Occupational therapy can help people with this condition be active in everyday life. By improving skills, learning other ways to perform daily tasks or introducing accessible equipment. An occupational therapist can help people perform daily activities with more ease and satisfaction.

Occupational therapy generally provides assessment, treatment and referrals in the following areas: arm and hand therapy, handwriting aids, home modification information, driver assessment and vehicle modification information, home work adaptations and cooking, dining and eating modifications, computer modifications, workplace adaptations and related equipment, leisure skill development, manual or power wheelchair use, bathing and toileting equipment, and dressing aids and combed [4].

### 3. Material and Methods

The case study took place over a period of approximately 6 months.

The evaluation of the subject was based on the application of the following tests:

- *Timed test – 25 foot walk* - The patient walk the distance of 25 steps (about 7.5 m). The patient can use assistive devices using an alert pace while moving, but without running. The route is marked accordingly and disruptive events (failed action) will be recorded.

- *Test 9 - Hole Peg* - is based on the quantitative assessment of upper limb function. During the research, both the dominant and the non-dominant limb were tested, twice consecutively; · May be influenced by visual impairment, even in conditions of good motor function of the upper limb. At the end, all disturbing events (inattention, interruptions, and

visual disturbances) must be recorded. The patient must successively insert the pieces he takes from the special container into the holes of the device, and after the correct placement of the last piece, remove them (also successively) and put them back in the container (without a break). The patient retrieves the dropped pieces on the table; the assessor retrieves the dropped pieces on the floor. The maximum accepted duration of the test is 5 minutes.

The score is constituted by the time required to perform the task (the best between the two attempts);

- *The Timed up and go test* – consists of assessing mobility and the risk of falling. The patient gets up from the chair, walks the distance of 3 m in a straight line (clearly marked), turns around and sits down after reaching the chair.

A training session (without timing) can be performed before the test. Walk at a normal pace, stopping and restarting, assistive devices, but not the help of another person, are allowed.

- *The SDMT test (Symbol Digit Modalities Test)* - Allows assessment of visual scanning, visual attention, speed of information processing and short-term memory.

It takes less than 5 minutes and consists of 3 sections: the educational part, the practical part and the actual testing.

The principle of the test consists in associating numbers and geometric figures, using a reference key.

The test can be performed in written or oral form, which allows patients with motor disabilities or speech disorders to pass it.

The simplicity of the test allows the assessment of patients regardless of education level and culture, spoken

language. It has a high sensitivity in the detection of cognitive disorders, their evaluation in dynamics, thus being an indicator of the response to treatment.

### 3.1. Individualized recovery program

Medical advances have prompted the development and evaluation of new therapeutic strategies and outcome measures for clinical trials [2].

Symptomatic and recuperative treatment has the general aim of improving the quality of life of patients with multiple sclerosis, while maintaining their social integration as long as possible.

Individual recovery and rehabilitation programs for patients with multiple sclerosis contain exercises to maintain joint mobility and increase muscle strength. Some of these exercises can be performed both actively and passively.

The exercises can be simple at first, it is recommended to gradually move to their grading depending on the patient's state of health and his evolution. In the care of the patient diagnosed with multiple sclerosis, massage sessions can be performed at the level of the muscles of the whole body and hydro-kinetic therapy sessions, with a very good effect at the level of the entire joint and muscle system.

The objectives of the individualized program targeted the following aspects:

- Evaluation of the effectiveness of kinetotherapeutic methods in order to recover the patient;
- Inducing voluntary motor activity;
- Improvement of sensory feed-back;
- Inhibition of unwanted motor schemes;
- Improving coordination;
- Prevention and treatment of joint swelling and muscle contractions;

- Improvement of cerebellar disorders (ataxia);
- Improving the health of the patient;
- Preventing the appearance of other conditions caused by metabolic disorders;
- Increasing muscle strength;
- Increasing and maintaining joint mobility.

Examples of kinetic exercises used according to recovery stages:

- *Stage I of recovery:*

- Lying on your back with the stick held by the ends down; perform forward/backward rotations with the help of the gymnastics stick;
- Lying on your back with the lower limbs flexed on a sponge medical support in the shape of an inverted T, alternating flexions-extensions are performed;
- Lying on the back with the arms in anteduction at 90°, anteduction of the arms up to 180° is performed.

- *Stage II of recovery:*

- Lying on your back with the lower limbs flexed on a medical sponge support in the shape of an inverted T and with 0.5 bags added at the level of the ankles, alternate flexions - extensions of the lower limbs are performed;
- Seated on the wheelchair, at the work table, the transfer of gymnastic hoops from one stack to the other right/left is performed with the upper limbs in turn;
- Seated at the edge of the medical bed, lifting is performed in the medical setting in an upright position.

- *Stage III of recovery:*

- Seated on the wheelchair facing the fixed ladder, climb step by step with sandbags at wrist level;

- Seated on the wheelchair facing the fixed staircase, the lifting from the chair is carried out in an upright position, after which a lateral swing of the pelvis is performed;
- Seated on the wheelchair, at the parallel bars, 10 normal walking steps are performed inside the bars.

The test was performed on both the affected upper limb and the healthy one, in both cases an evolution can be seen in the execution of the movement, on the healthy limb a positive difference of 1.04, and on the affected one by 1.30 minutes, figure 3.

**4. Results and Discussions**

In the Timed 25 foot walk test, a positive difference is observed between the two tests, namely from 4.35 minutes to 3.38 minutes, which indicates a relevance of the actuation systems applied in the individualized program, figure 2.

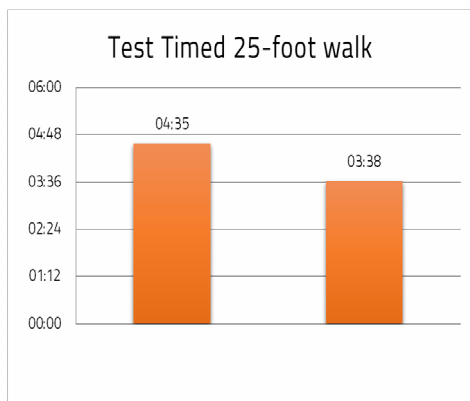


Fig. 2. *Test Timed 25 foot walk*

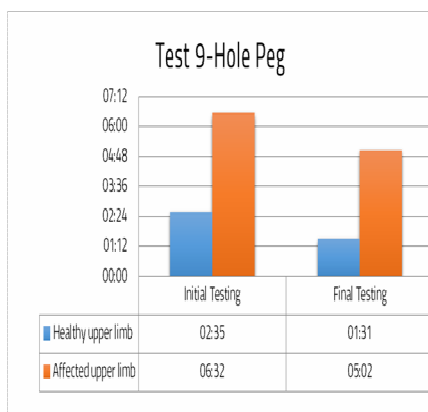


Fig. 3. *Test 9 – Hole Peg*

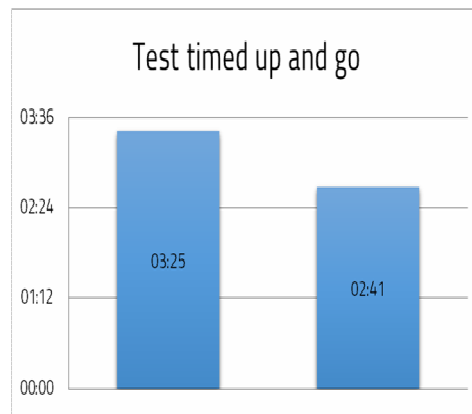


Fig. 4. *Test Timed up and go*

The up to go test was carried out adapted to the level of parallel bars. Thus, the patient had the opportunity to properly support himself between the medical bars. The obtained values indicate that there was an improvement of 1.24 minutes between the two tests, figure 4.

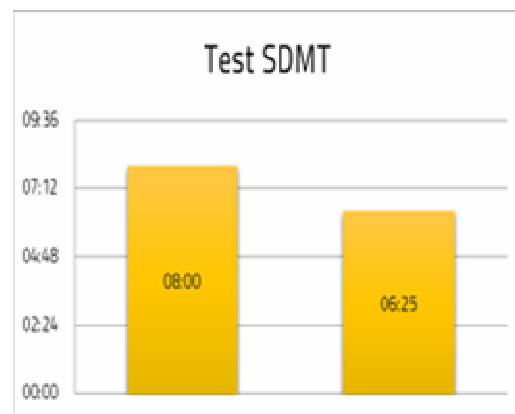


Fig. 5. *Test SDMT (Symbol Digit Modalities Test)*

The SDMT test, fig.5, offers the patient the possibility of testing cognitive impairment. The test includes a model of symbols matched with certain numbers, and the subject is asked to match the numbers to the list of symbols in time according to the model. An evolution is observed in the faster performance of the test by the patient with a time from 08.00 minutes to 06.25 minutes. This result highlights the degree of mobility achieved by the patient following the recovery program.

## 5. Conclusions

This work specifically looked at the application of recovery in multiple sclerosis, with the aim of making people with such conditions aware of how important the application of physical therapy is in recovery.

The problematic approach to the topic is due to the interest shown by the severity of the condition, due to the rather high percentage of people who have such neurological conditions.

In the condition treated, the designed program led to small but beneficial results for the patient. The results obtained show us a clear positive evolution, each test confirms this aspect. As an argument related to the small results obtained, it is based on the fact that this is a degenerative neurological condition, and the main goal was to relieve pain, adapt to the disease and improve lifestyle.

Multiple sclerosis is one of the most complex and variable conditions encountered by rehabilitation specialists.

Changes in body functions in multiple sclerosis include impairments in mental functions, often manifesting as fatigue or depression, which occur as a result of

axonal demyelination in brain locations that are involved in processing these emotions.

These changes in body functions lead to alteration of the patient's physical activity.

Physical inactivity or adopting a sedentary lifestyle is common in these patients and can initiate a cycle of deconditioning and worsening symptoms. In contrast, engaging in an exercise program may have beneficial effects on the condition of patients with multiple sclerosis.

Exercise training has beneficial effects on muscle strength, aerobic capacity, and ambulatory performance, potentially reducing fatigue and improving gait, balance, and quality of life in patients with multiple sclerosis [6].

## References

1. Bajenaru, R., Tanasescu, C., Tiu, S., et al.: *Ghid de Diagnostic și Tratament în Scleroza Multiplă (Diagnosis and Treatment Guide in Multiple Sclerosis)*. Available at: <https://emedic.ro/ghid-de-diagnostic-si-tratament-in-scleroza-multipla>. Accessed: 20-02-2023.
2. Ben-Zacharia, A.B.: *Therapeutics for Multiple Sclerosis Symptoms*. In: Mount Sinai Journal of Medicine. 2011, 78(2), 176-191, doi: 10.1002/msj.20245.
3. Cioroiu, S.G.: *Essential in anatomy and biomechanics*. Braşov, Transilvania University Publishing House, 2006, 48.
4. Cohen, J.A.: *The future of multiple sclerosis treatment*. In: J. of the Neuro. Scien. 2009. 277(1), p. 555-561, doi: 10.1016/S0022-510X(09)70015-2.

5. *Dicţionar de afecţiuni, simptome, investigaţii şi tratamente (Dictionary of conditions, symptoms, investigations and treatments)*, Available at: <https://www.reginamaria.ro/utile/dictionar-de-afectiuni/scleroza-multipla-scleroza-placi>. Accessed: 20-02-2023.
6. Florea, A., Cristian, R.: *Tipuri de scleroză multiplă. Simptome şi cauze ale unei boli autoimune (Types of multiple sclerosis. Symptoms and causes of an autoimmune disease)*, Available at: <https://smartliving.ro/tipuri-de-scleroza-multipla/> Accessed: 02-03-2023.
7. Mihancea, P.: *Scleroză multiplă (Multiple sclerosis)*. Oradea, Publishing House of the University of Oradea. 2005, 282.
8. Poser, C.M.: *The diagnosis and management of multiple sclerosis*. In: *Acta Neurol Scand.*, 2005, 112 (3), p. 199–201, doi: 10.1111/j.1600-0404.2005.00450.x.
9. Sander, L., Kugler, J., Elsner, B.: *The influence of multiple sclerosis-related symptoms on health-related quality of life*. In: *Fortschritte der neurologie psychiatrie*. 2020. 88(11), 704-712, doi: 10.1055/a-1113-7702.
10. *\*\*\*Scleroză multiplă (Multiple sclerosis)*, Available at: [https://ro.wikipedia.org/wiki/Scleroz%C4%83\\_multipl%C4%83](https://ro.wikipedia.org/wiki/Scleroz%C4%83_multipl%C4%83). Accessed: 21.02.2023.