

## Effects of a physiotherapy rehabilitation program on the quality of life in multiple sclerosis patients

*Efecte ale tehnicilor de recuperare fizioterapeutică asupra calității vieții la pacienții cu scleroză multiplă*

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### Abstract

**Background.** Multiple sclerosis is an autoimmune, inflammatory disorder of the central nervous system that primarily affects the young adult. Characterized by a complex symptomatology, MS causes numerous physical and psychological disorders. Although many experimental studies confirm the usefulness of certain rehabilitation methods to reduce fatigue, pain and alleviate others symptoms, a complex and personalized protocol has not been practiced so far to ensure a significant improvement in the quality of life of people affected by MS.

**Aims.** The purpose of this study is to demonstrate that a supplementation of the conventional physiotherapy (PT) program with a personalized and complex PT intervention during one year will improve the overall quality of life of MS patients, and subsequently will optimize and increase the efficiency of the conventional PT protocol.

**Methods.** In addition to a conventional PT program, the experimental group also benefited from a personalized and complex PT intervention for three months, 2 sessions/week, and for 9 months, 2 sessions/month, aimed to improve the quality of life: breathing exercises, proprioceptive neuromuscular facilitation techniques, massage techniques, cervical tractions, manual lymphatic drainage. To assess the quality of life, the 36 Items Short Form Survey (SF-36) was used.

**Results.** After three months, the improvement of the quality of life was not significant ( $p = 0.077$ ), but it was at the end of the experiment, after 12 months ( $p = 0.031$ ). In the control group, the quality of life score had a slightly decreasing trend but not significant.

**Conclusions.** The results obtained by applying the complex PT program, on a regular and weekly basis, can be attributed to the improvement of the quality of life of MS patients who participated in the research study. Rehabilitation of MS patients requires a complex approach throughout their life.

**Keywords:** multiple sclerosis, combined kinetic techniques, quality of life

### Rezumat

**Premize.** Scleroza multiplă (SM) este o boală autoimună, inflamatorie a sistemului nervos central, care afectează preponderent adultul tânăr. Caracterizată printr-o simptomatologie complexă, SM produce numeroase suferințe la nivel fizic și psihologic. Cu toate că numeroase studii experimentale confirmă utilitatea anumitor metode de recuperare în vederea reducerii oboselei, durerii și ameliorării altor simptome, până în prezent nu s-a practicat un protocol complex și personalizat, care să asigure o ameliorare importantă a calității vieții persoanelor afectate de SM.

**Obiective.** Obiectivul acestui studiu este de a demonstra că o suplimentare a programului fizioterapeutic convențional cu o intervenție personalizată și complexă de tehnici în decurs de un an va îmbunătăți calitatea generală a vieții pacienților cu MS, va optimiza și va crește eficiența protocolului de recuperare convențional.

**Metode.** Grupul experimental a beneficiat în plus față de programul de fizioterapie convențional și de tehnici de armonizare holistică, timp de 3 luni, 2 ședințe/săptămână și timp de alte 9 luni, 2 ședințe/lună, constând din: exerciții de respirație, tehnici de facilitare neuroproprioceptivă, tehnici de masaj, decoaptări cervicale, drenaj limfatic manual. Pentru a evalua calitatea vieții, s-a utilizat "36 Items Short Form Survey (SF-36)".

**Rezultate.** Ameliorarea calității vieții la grupul experimental a fost semnificativă doar după 12 luni, la sfârșitul experimentului ( $p=0,031$ ), în schimb, grupul de control a înregistrat un ușor regres al scorului calității vieții.

**Concluzii.** Creșterea calității vieții pacienților cu SM din grupul experimental se datorează suplimentării programului PT convențional cu programul de armonizare holistică.

**Cuvinte cheie:** scleroză multiplă, tehnici kinetice combinate, calitatea vieții

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## Introduction

Multiple sclerosis (MS), clinically described for the first time by Charcot (Sabău, 2006), is a complex, multifactorial, chronic autoimmune central nervous system disease characterized by inflammatory, demyelinating and gliosis processes (O'Sullivan et al., 2014), requiring an assessment by neurologists, psychiatrists, physiotherapists and other specialists of the multidisciplinary team (Frontera, 2010). Multimodal symptomatology is present depending upon the localization of lesions (Moțet, 2010), and includes sensory deficits, motor, cognitive and functional disorders, leading to limited participation in daily activities and restricted participation in social activities, drastically reducing the quality of life of the affected person (Burscha et al., 2014). The clinical manifestations of MS are: pyramidal, cerebellar, vestibular and mixed (Marcu & Dan, 2007). The highest prevalence of MS was recorded in the Orkney and Shetland Islands, 450 per 100,000 inhabitants, and the lowest prevalence of multiple sclerosis is reported in subequatorial areas, less than 5 persons per 100,000 inhabitants. The MS prevalence reported across our country is 25 per 100,000 inhabitants (Mihancea, 2011). Statistical data shows that the incidence of MS is 2-3 times higher in females, and the age of onset is between 15 and 50 years (Câmpeanu, 2007). In Romania, the cost of treatment for a patient with MS can rise up to 1200-1300 euros/month (1). In the USA, the treatment cost for a patient presenting with MS is also very high. According to the North American Research Committee on MS, the average annual cost for MS-affected patients who were treated with disease modifying agents reached \$ 47,215 (Jurcău, 2009).

The multitude of psycho-emotional disturbances and functional imbalances that drastically reduce the quality of life of people affected by MS and cause significant financial and socio-professional damage continues to stimulate researchers' interest in finding optimal solutions both in relieving the symptoms of the disease and in reducing treatment costs. In our country, classical physiotherapy practice in most neurological rehabilitation centers addresses group and individual therapy. The reduced number of physiotherapists in these centers does not allow the individualization of the complex programs, which, besides the possibility of symptom relief, could reduce the high cost of treatment in MS patients.

By carefully analyzing the medical, social and financial context these people face, we considered appropriate to develop and implement a complex PT program to support the classical/traditional PT rehabilitation protocol in order to improve clinical symptomatology, to reduce the bouts, and stop disease progression. We believe that the techniques of the proposed PT program will have a measurable positive effect on the health status of subjects suffering from MS, compared to the classical PT program.

## Material and methods

The University of Oradea Research Ethics Board approved this study.

### Research protocol

#### a) Period and place of the research

The experimental study was conducted over a 12-month

period, from April 2016 to April 2017.

#### b) Subjects and conduct of research

A total of 82 patients with multiple sclerosis participated in the study. The study group included 43 patients from the Speromax Multiple Sclerosis Association, Alba-Iulia, out of which 18 men (41.86%) and 25 women (58.14%), with a mean age of  $49.81 \pm 8.72$  years. The control group comprised 39 patients from the Day Care Center, Oradea, 15 men (33.33%) and 24 women (66.67%), with a mean age of  $49.08 \pm 9.38$  years (Table I).

**Table I**  
Characteristics of both groups according to gender and age

Characteristics of the subjects	Experimental group n=43		Control group n=39	
	Female n=25	Male n=18	Female n=24	Male n=15
Gender (%)	58.14	41.86	66.67	33.33
Age (years)	49.81±8.72 years		49.08±9.38 years	

The inclusion criteria in the study were: confirmed MS diagnosis; written consent from patients and acceptance of the physician and the physiotherapist.

Both groups attended a classical physical therapy program with a physiotherapist, 3 times/week, for 12 months. A complex program aiming to harmonize and relax the whole body was added to the classical PT program of the experimental group, over a period of three months twice a week, and for another nine months twice a month. All patients were evaluated: at baseline, after three months and at the end of the experiment, after 12 months.

#### c) Tests applied

The 36-Item Short Form Health Survey (SF-36) was used to assess quality of life. It includes the concept of well-being and the perception of health. "The 36-Item Short Form Health Survey (SF-36). SF-36 is a set of generic, coherent, and easily administered quality-of-life measures. The RAND 36-Item Health Survey (Version 1.0) taps eight health concepts: physical functioning, bodily pain, role limitations due to physical health problems, role limitations due to personal or emotional problems, emotional well-being, social functioning, energy/fatigue, and general health perceptions"(2).

#### The PT program

- The traditional therapeutic methods applied to both groups of patients included: PT, psychotherapy, massotherapy, assisted lymphatic drainage and occupational therapy.

- The complex PT program applied to the experimental group consisted of breathing exercises, proprioceptive neuromuscular facilitation techniques, myofascial massage, compressive tendon massage, plantar reflexology massage, cervical traction, manual lymphatic drainage. The session duration per patient was 30-45 minutes. The complex PT program comprised 1-2 sessions per week for the first 3 months, and 1-2 sessions per month for the next 9 months. The rehabilitation treatment was individualized.

#### d) Statistical processing

The calculation of treatment efficacy on the studied set of physical parameters was performed by applying the following algorithm for each parameter: a favorable evolution was noted with 1, a stationary evolution was

noted with 0, and an unfavorable evolution was noted with -1. For each step, a global score was calculated as the sum of the figures corresponding to the five parameters, as follows: the evolution over the first 3 months, the evolution over the next 9 months, the 12-month evolution. The score is between -5 (when all parameters have an unfavorable evolution) and +5 (when all parameters have a favorable evolution.) After calculating the score, this was divided by 9, the resulting percentage expressing the overall efficacy of treatment.

The statistical analysis was performed using EPIINFO, version 6.0, a program of the Center for Disease Control and Prevention in Atlanta and the WHO, adapted to medical statistics, and SPSS 19 processing. Parameter averages, frequency ranges, standard deviations, statistical significance using the Student method (t test) and  $\chi^2$  (chi2) were calculated. The significance threshold was considered at  $p < 0.05$ .

## Results

Changes in quality of life scores in the experimental group

### a) Baseline to 3-month evaluation

Quality of life and physical and mental parameters increased after 3 months, but only in the mental field the difference was significant ( $p = 0.040$ ), as shown in Table II.

### b) Baseline to 12-month evaluation

After 12 months, all the scores were significantly improved (Table II).

Changes in quality of life scores in the experimental and control groups.

At baseline there was no difference between the results of the two groups.

### c) 3-month evaluation and 12-month evaluation

At 3 months and at the end of the experiment, all the scores of the experimental group increased compared to those of the control group.

## Discussions

The quality of life scores in the experimental group had an increasing trend over the three evaluations. Even though the extra PT program was very intensively applied in the first three months, the increase in the quality of life score was not significant after three months. The augmentation of the score became significant only at the end of the experiment, after 12 months.

Numerous studies have confirmed that regular physical activity improves health-related quality of life in patients with MS (Kerdoncuff et al., 2006). In a meta-analysis, Heine

et al. found in a total of 45 experimental trials, studying 69 exercise intervention programs in 2250 SM patients, a significant effect of physical activity, particularly in reducing severe fatigue (Heine et al., 2015). Another study at the University Hospital of Pisa (Italy) in 2014 revealed that the exercise program applied to a group of 17 MS patients, organized as a circuit, for 120 minutes/day during 5 days, had a positive impact on quality of life (Chisari et al., 2014). Another experimental study conducted at Indiana University-Purdue University Indianapolis on a sample of 292 subjects with MS diagnosis who performed a physical activity for 7 days confirmed a slight improvement in their quality of life (Motl et al., 2009). Exercise training had a positive impact on factors related to quality of life (Petajan et al., 1996). Our findings support physical activity as a possible modifiable behavior for mitigating reductions of QOL by improving self-efficacy in individuals with MS (Motl & Snook, 2008).

Taking into account all these findings, we consider that the increased score in quality of life was due to the physical activity intervention. Furthermore, the fact that the control group showed no improvement in their self-reported quality of life, even though they undertook the classical PT program, means that the supplementation of the PT program in the experimental group was critical in obtaining significant results. The improvement in the quality of life of the experimental group patients may also be attributed to the personalized way the complex techniques were applied.

There is a lot of evidence for the relaxing effect of massage and manual lymphatic drainage. The improvement of the individuals' personal health rating following massage treatments is a trend that is supported in the literature. In one study, after five weeks of massage treatments, MS patients displayed decreased anxiety, overall improved mood, a more positive opinion of the treatment management, better self-esteem, and improved body satisfaction (Hernandez-Reif et al., 1998). Another study also found a significant increase in MS patients' general health and well-being after six weeks of reflexology treatments (Mackereth et al., 2009). It is also possible that the improvements in health perception were due to the benefits of relaxation and stress relief. In another study, chronic pain patients displayed 36% decreased clinic visits after behavioral medical interventions were employed to promote relaxation and reduce stress (Caudill et al., 1991). As in many chronic illnesses, stress has been implicated in the aggravation of symptoms (Heesen et al., 2007). Thus, stress management in MS protects the body's ability to control inflammation

**Table II**

Quality of life scores in both groups, at baseline, after 3 months and at follow-up

Parameters	Experimental group			Control group		
	Baseline	After 3 months	After 12 months	Baseline	After 3 months	After 12 months
Quality of life	40.84±14.25	46.14±13.18	47.28±12.95 ( $p=0.031$ )*	38.29±6.86	38.10±7.30 $p=0.001$ **	36.05±8.02 $p<0.0001$ **
Physical	38.15±13.80	42.27±13.69	44.66±12.45 ( $p=0.024$ )*	37.40±6.23	37.09±6.60 ( $p=0.034$ )**	35.28±7.59 ( $p=0.0001$ )**
Mental	43.51±15.37	49.99±13.32 ( $p = 0.040$ )*	50.29±14.16 ( $p=0.036$ )*	39.17±8.73	39.10±9.07 ( $p=0.0001$ )**	36.82±8.95 ( $p=0.0001$ )**

\* P-values are shown for the differences in change over time in the experimental (same) group

\*\* P-values are shown for the differences between the scores of the experimental and control groups for the same assessment

and to better manage symptoms. Therefore, we consider that these two techniques had an important contribution to the mental and physical well-being improvement in the experimental group.

A short-duration combined respiratory muscle training program improved inspiratory and expiratory muscle strength, reduced fatigue in patients with mild to moderate MS, and contributed to maintaining emotional well-being and general health (Medical Outcomes Study 36-Item Short-Form Health Survey) (Ray et al., 2013).

Applied massage techniques, correlated with cervical traction, relax and harmonize the body to the deepest structures, giving both physical and emotional well-being, as well as a capacity to physically perform certain activities. The scores obtained from the interim and final evaluation of the quality of life items can confirm the efficacy of the new PT approach, as well as the importance of applying these techniques in a certain succession in order to achieve the proposed goal.

The “sine qua non” condition for increasing quality of life as well as for improving the overall symptomatology of people affected by MS is a complex and personalized approach to PT techniques.

Complex kinetic techniques have addressed the harmonization and relaxation of the whole body, as it is known that a physically balanced body provides increased effort and induces a state of emotional well-being and comfort.

The proposal of this new concept of complex kinetic techniques aims to find the optimal strategy for improving quality of life.

The succession of the applied techniques within the new complex concept is essential for the purpose of holistic harmonization of the body. The effort of a harmonious and relaxed body increases considerably.

## Conclusions

1. In the study group, after 12 months of treatment, there was an improvement in both the physical and mental range, while the control group showed a reduction in scores in both areas.

2. Physical impairment decreased in the study group and increased in the control group after 12 months of treatment, and physical fitness and general health increased in the study group and decreased in the control group.

3. A well systematized and sustained complex PT program improves the quality of life of patients with multiple sclerosis.

## Conflicts of interest

There were no conflicts of interest to declare.

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