Original Article

Aspects of kinetic treatment in patients with polyneuropathy

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Abstract

Problem Statement. Polyneuropathies are characterized by sensory- motor and trophic symptoms, prevalent in the bilaterally symmetric distal extremities. Polyneuropathies may cause muscle deficits leading to tetraplegia or paraplegia, accompanied by hypotonia and muscle atrophies, osteo-tendinous areflexia, as well as subjective and objective sensory impairments, which are also symmetric and bilateral in nature. Lack of any signs of pyramidal tract dysfunction is an essential condition in establishing diagnosis. One of the principles of kinetic treatment is that it must be set in place early in order to prevent joint stiffness, musculotendinous retraction and secondary muscle atrophies. The purpose of the study was to highlight how important and effective kinesiotherapy is for patients with polyneuropathy. **Research method** – the study relied on the following methods: bibliographic, case study, tests, conversation, observation and graphical. **Material.** The study was conducted on a 57-year old patient diagnosed with polyneuropathy, who carried out a 12- month recovery program. The assessment tests used were: Katz index, Osseman score, Tinetti balance test, Tinetti gait test and the primary goal of rehabilitation was to re-educate walking and regain independence in performing activities of daily living. **Outcomes.** Comparison of the initial tests to the final ones showed a significant improvement of the patient with polyneuropathy, as he went from being dependent on another person to partially independent in performing the activities of daily living; this means an improvement in strength and muscle tone, coordination, balance and the quality of walking. **Discussions.** According to the literature, recovery treatment for patients with polyneuropathy must begin immediately after the diagnosis was established, in order to prevent motor damage from getting worse. **Conclusions.** Kinesiotherapy in polyneuropathies essentially aims to improve some motor damage caused by the disease, which narrow down the functional freedom degree and independence of patients both in their own home, and outside it. Administration of a kinetic program, closely monitored and personalized depending on the subject's individual particularities, has successfully contributed to significant results with regard to the increase of the quality of life for the patient with polyneuropathy.

Key words: polyneuropathy, functional independence, kinesiotherapy.

Introduction

Polyneuropathies (peripheral neuropathies) are the most common type of disorder of the peripheral nervous system in adults, and specifically in the elderly, with an estimated prevalence of 5-8%, depending on age (Sommer, C., et. al, 2018). Polyneuropathies (polyneuritis) are characterized by concomitant disorders of several nerves. It is usually bilateral and symmetric, predominantly on the lower limbs; many times, all four limbs are affected; sometimes cranial nerves are affected too (Păun, R., 1982, pp. 123).

The disease onset is in a few days or weeks and it presents as numbness, tingling, twinges on the extremities of limbs, subsequently associated with pain and motor deficit, first in the feet, and later on, in hands too, leading most of the times, to a paraparesis or sensitive-motor tetraparesis (Gherman, D., Moldovanu, I., Zapuhlăh, G., 2003, pp. 68) Palsy is always underlined by high degree of muscle hypotonia and significant muscle atrophy, but never as massive as in direct lesions of the motor perikaryon from anterior horns (poliomyelitis) (Constantin, Arseni, Liviu, Popovici, 1981, pp. 162). The kinetic recovery program is designed based on the clinical and functional reality, motor and sensory damage tested (Sbenghe, T., 1987, pp.594). Rehabilitation of such patients should start as early as possible once the diagnosis has been established (Novak, P. Vidmar, G., Kuret, Z., Bizovičar, N., 2011).

The recovery treatment may approach the patient as a whole, influencing both the painful symptomatology, if it exists, and the functional impairments caused by the nervous damage (Lapadat, G., Popescu, R., 2013). During convalescence, an important part is played by the mobilization of the paralysed segments. Physical therapy sessions shall be performed two to three times a day for 10-20 minutes of passive mobilization, directed at preservation of the whole range of motion. As active movements are possible again, they shall participate more and more in mobilizing the segments. Then, the exercises shall successively consist of sitting position, getting up from the bed, upright position, walking, using crutches or parallel bars, if need be (Păun, R., 1982, pp. 94).

Material and method

The purpose of this study was to highlight how important, but also how effective kinesiotherapy is for patients with polyneuropathy.

Thus, the working hypothesis in carrying out this approach was the following: if a kinetic program will be administered, by closely monitoring and personalizing it depending on the subject's individual particularities, this will lead to both recovery of the motor functions affected, and to regain of independence of these patients with regard to the performance of the activities of daily living.

The study was conducted over a period of 12 months on a 57 year old male patient, whose discharge diagnosis was mixed polyneuropathy, predominantly sensory axonal and paraparesis. Recovery started right after the patient was discharged from hospital, at his home.

The research methods used were as follows: bibliographic, case study, tests, conversation, observation and graphical.

The assessment tools used were the following: Katz index, Osserman score, Tinetti balance test, Tinetti gait test "Get Up and Go".

The kinetic program was carefully designed, taking account of the results obtained by the patient in the initial tests, and also of the related conditions; the following objectives were at its basis:

- Prevent joint stiffness and correct faulty positions;
- Educate- re-educate the paralysed musculature;
- Re-educate balance and walking;
- Improve muscle contracture;
- Improve muscle strength and joint mobility;
- Increase control and balance;
- Improve trophicity and muscle tone;
- Prevent and treat vascular and trophic disorders;
- Regain functionality and capacity;
- Respiratory re-education;
- Improve the quality of life.

Methods and means used: posture exercises in a corrective, rather than antalgic position, passive, passive-active, active-passive, active free and active mobilizations with resistance from the kinesiotherapist, free breathing exercises and associated with upper and lower limbs movements, Kabat diagonals, neuro-proprioceptive facilitation techniques, walking exercises between parallel bars, walking over obstacles, lateral walk, stair climbing/climb down (seven – eight repetitions for each walking type), ergometric bicycle pedalling. The kinesiotherapy sessions were carried out four times per week for 12 months, the patient participating actively and consciously in the recovery process. The exercises were based on stable and sound starting positions, intended to facilitate the intense labour of the muscles and then enable the best recovery possible from this labour and they were performed slowly, rhythmically without any gaps.

Outcomes and discussions

Further to the analysis of results obtained by the assessment tests, the following aspects can be noted:

Table 1 Katz Index

	Initial test	Intermediary test	Final test
Katz index score	10 p	7 p	3 p

Fi.1. Patient progress using Katz Index

Patient's evolution in terms of dynamic assessed by Katz index reveals a significant improvement of the capacity to perform the ADLs, which means going from the stage of dependency to another person to partial independency in carrying out the tasks inside the household (table 1, figure 1).

Table 2. Osserman Score

Score	Initial test	Intermediary test	Final test
	25 p	40 p	55 p

Fig. 2. Osserman Score's progress during the research

Osserman score's value at the end of the recovery period shows significantly improved overall strength, the patient managing to perform complex exercises much more accurately, with better coordination, and no signs of muscle fatigue which would require him to stop or to take very long breaks in between the exercises (table 2, figure 2).

Table 3. Tinetti balance and gait test

Score	Initial test	Intermediary test	Final test
Tinetti balance test score	20 p	13 p	5 p
Tinetti gait test score	1 p	10 p	19 p

Fig. 3. Patient progress using Tinetti balance and gait test

Comparative analysis of the initial test to the final one in the Tinetti gait test and Tinetti balance test showed a favourable evolution of the patient. He succeeded in covering bigger and bigger distances inside his home and around it with minimal assistance from his next of kin, without any significant balance disorders which would endanger his stability during walking (table 3, figure 3)

Conclusions

Kinesiotherapy's aim in treating polyneuropathies is to essentially improve some motor damage caused by the disease, which narrow the functional freedom degree and independence of patients both in their own home, and outside it. This research confirms the need for early implementation of kinetic treatment in this category of patients in order to minimize the disease-induced negative effects as much as possible.

Thus, administration of a varied palette of kinetic techniques and means led to a significant improvement of muscle strength and tone, balance and quality of walking, the patient gradually succeeding to remain to optimal functional parameters, needed to carry out the activities of daily living, under very little help or even independently in certain situations. Administration of a kinetic program, closely monitored and personalized depending on the subject's individual particularities, has successfully contributed to significant results with regard to the increase of the quality of life for the patient with polyneuropathy.

Recovery of the movement's execution speed may not be deemed as a final objective of kinesiotherapy in recovering the peripheral motor neuron lesions. Surely, gradual training leads to execution of more and more movements on the time unit at a minimum energy consumption (Kiss, I., 1989, pp. 37).

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