

THE INFLUENCE OF KINESITHERAPY OVER DYNAMIC BALANCE IN PATIENTS WITH ISCHEMIC STROKE IN VERTEBRAL BASILAR SYSTEM

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Abstract. To study the effect of applied kinesitherapeutic program with included Swiss ball exercises over dynamic equilibrium at patients suffering from ischemic stroke in the vertebral basilar system (VBS) in a subacute period.

We have studied 15 patients, who were evaluated by the help of the following tests and parameters: walking 3 meters, a test "Sit-to-Stand" and a test "Timed Up& Go". We have conducted for all patients a ten-day kinesitherapeutic course and standard medical treatment.

After the end of the kinesitherapeutic procedures, we established considerable improvement in the dynamic balance, rendered objective by reducing the time necessary for the five-time performance of the movement standing up-sitting down as well as in the combined test including also the passing of 3 meters and going back. We did not establish considerable changes with regard to the steps when passing 3 meters.

The use of therapeutic Swiss Ball exercises exerts positive influence over dynamic balance and over the walking pattern at patients suffering from ischemic stroke in the vertebral basilar system in the subacute period.

Key words: dynamic balance, Swiss ball, walking pattern

Brain and vessel disturbances take a major place among the socially important widespread disease in our country. Their essential medical and social importance is a result not only from the high disease and mortality rate but also due to the heavy disability of some of the patients who have lived through a stroke [6].

Kinesitherapy (KT) is of decisive importance for the optimal functional recovery, the prophylaxis of preventable disability and for the achievement of the possible independence in daily life considering the seriousness and the type of the brain insult. The whole medical, psychological and social evaluation allows to be defined the rehabilitation potential of patients, to be made concrete the rehabilitation goal and to be outlined and specify for every patient kinesitherapeutic program [8, 13].

At insults in the vertebral basilar system, we observe disturbances leading to difficulties in precision, the coordination of movement and balance [1]. Good balance requires constant training. The Swiss Ball exercises give us such an excellent opportunity, because they are performed on a dynamic support, which requires a frequent change of the gravity center. The Swiss Ball exercises can increase considerably muscular strength and endurance, the coordination of movement and balance as well body control in sitting and upright position [2, 3].

There are different kinesitherapeutic methods at patients with stroke, but the influence of physical exercises with a Swiss Ball at balance disturbances, that are present at vessel damages in the basilar vertebral system, have not been studied yet.

Hereby, we set the goal to study the therapeutic effect from the application of a kinesitherapeutic program, including physical exercises with a Swiss ball, over the changes in the dynamic balance at patients suffering from brain insult in the vertebral basilar system (VBS) in a postcritical period.

METHODS

The present research was conducted in the medical ward of "Physical therapy and rehabilitation" at the Multi-profile Hospital for Active Treatment-Elin Pelin town. We have studied 15 patients suffering from ischemic brain insult in the vertebral basilar system, out of which 6 were men and 9 were women, at an age between 53 and 74 years.

The functional condition of each patient was evaluated before and after the conducted ten-day kinesitherapy. We have assessed changes in dynamic balance using the following tests: "Sit-to-Stand", Timed Up & Go (TUG) and walking -3m along a straight line (number of steps). The test "Sit-to-Stand"

reports the time in seconds for the performance of a 5-time repetition of the movement standing up from and sitting on a 45 cm -high chair [5, 14]. By the help of “Timed Up and Go” we report in seconds the time for getting-up from a chair, passing of 3 meters, return back to the chair and sit down on the chair [14, 12].

We have performed for all patients ten procedures in the field of kinesitherapy as each of them lasted 45 minutes. The goal of the applied kinesitherapeutic program is the patient’s maximal functional recovery after an ischemic insult in the vertebral basilar system. We have included in the warm-up part of the procedure breathing exercises and active exercises for the upper limbs in order to be improved the functions of respiratory and cardio-vascular systems. The main part consists of balance and coordination exercises with a Swiss ball from the initial positions of sitting and standing up in order to be influenced the patient’s balance reactions and coordination abilities. In order to improve the gait, we have included different types of walking with a change in the direction of movement and overcoming the obstacles. The KT complex ends with relaxing exercises and autogenic training for the normalizing the physiological functions of organism after the applied loading.

RESULTS

The results from the tests objective the changes in dynamic balance are given in the table 1.

Table 1 Changes in the dynamic equilibrium before and after treatment

Indicator	Beginning		End		Increase	t	p
	X 1	S _D	X 2	S _D			
1. Number of steps for 3 meters of walking	8,86	0,96	8,13	0,94	0,73	0,94	<0,1
2. Sit-to-stand Test (s)	14,97	0,98	3,77	1,07	1,20	3,20	<0,01
3.” TUG ” (s)	13,89	1,95	11,01	2,09	2,88	3,90	<0,01

At the test walking along a straight line we reported the number of steps when passing the 3-meter test distance. According to the average values the improvement is with 0.73, which means that their total number has decreased slightly after the applied kinesitherapy in comparison with the initial values.

The initial values from the test “TUG” show that we needed on the average 13.89 seconds for its performance in the beginning. At the end of our research, the time for performing this test has decreased averagely to 11.01 seconds. We reported a considerable improvement with 2.88 seconds.

These data can be associated with the obtained results from the test “Sit-to-Stand”. Before the kinesitherapy procedures the time necessary for performing the test was 14.97 seconds and after finishing the course of kinesitherapy treatment it was reduced to 11.77 seconds. We establish considerable improvement of 3.20 seconds also by this test.

DISCUSSION

The results from the our research show that the applied kinesitherapy influences favorably the dynamic balance at patients suffering from ischemic stroke in the vertebral basilar system.

The included in these methods expedient active exercises and walking with a change of direction and overcoming the obstacles favor the balance abilities of the observed patients [10]. The positive changes are most probably due to the influence of the mentioned exercises over the mobility and coordination of lower limb movements [11].

We consider that the prevalent in the kinesitherapeutic complex Swiss Ball exercises are of greatest importance for the substantial improvement in dynamic balance. Their performance leads to an increase in ankle joint mobility and more specially improves the chances for performing a dorsal flexion, which is an important factor when exercising locomotion control. Meanwhile, the use of fit-ball exercises increases the muscular strength and the endurance of lower limbs, facilitating movement and the transfer of body from one position into another [4]. The positive effect of the above-mentioned exercises is associated with their favorable influence over the vestibular apparatus and over the cerebellum function [7]. The performance of these exercises provokes strong afferent proprioceptive stimulation due to the frequent change of body posture [9]. They provide an opportunity for dynamic support at their performance, which leads also to a change also in the gravity center - an important factor for influencing balance possibilities [2]. The present research data show that the Swiss Ball exercises have favorable influence over dynamic

balance and are suitable for application at patients suffering from ischemic brain insult in their vertebral basilar system.

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