

The Impact of Isokinetic Training on Patients after Stroke Muscles Strength and Muscles Endurance

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Introduction. The impairment of lower limb muscle function is a common consequence of stroke. Muscle strength and muscle endurance training is one of the main stroke rehabilitation components [1]. During rehabilitation muscles strength and muscles endurance training is carried out using isokinetic dynamometer which allow objectively assess the functional status of muscles and to increase the load safely comparing with manual muscle testing and training which gives more subjective results [2]. Additionally using the isokinetic dynamometer the patient can see the feedback of each movement in monitor and volitionally control muscle contractions.

Materials and methods. The research was carried out in Rehabilitation, Physical and Sports Medicine Centre of Vilnius University Hospital Santariskiu Klinikos. The subjects were randomly assigned to either the experimental or the control group (Table 1).

Table 1. General characteristics of subjects

Criteria	Experimental group (n=18)			Control group (n=18)			P
	Min	Max	Average±SD	Min	Max	Average±SD	
Age (years)	46	77	56.17±8.1	47	74	58.56±7.7	0.370
Height (cm)	157	198	177.11±9.83	167	186	174.5±4.7	0.318
Weight (kg)	60	125	89.06±16.7	59	140	82.83±18.7	0.299
Days after stroke	3	10	5.94±2.2	3	10	6.5±2.1	0.450
Affected side Left (n=17) Right (n=19)	7 (38.9%) 11 (61.1%)			10 (55.6%) 8 (44.4%)			0.317
Gender Men (n=29) Women (n=7)	15 (83.3%) 3 (16.7%)			14 (77.8%) 4 (22.2%)			0.674

Both groups received a conventional individual physiotherapy. The experimental group received isokinetic training with isokinetic dynamometer (Gymnax ISO - 1) instead of specific muscles strength and endurance exercises for control group (Fig. 1). Subjects were tested 3 times: at baseline (I), followed by 10 sessions (II) and after 3 months (III).



Fig. 1. Isokinetic dynamometer (Gymnax ISO - 1)

Muscle function was evaluated using 90°/s and 240°/s test modes. The training of lower extremity muscle strength was carried out using 180°/s mode, for muscles endurance - 300°/s mode. Before and after each training on isometric dynamometer 5 minutes cycling was carried out. Other outcome measurements were used for collecting data.

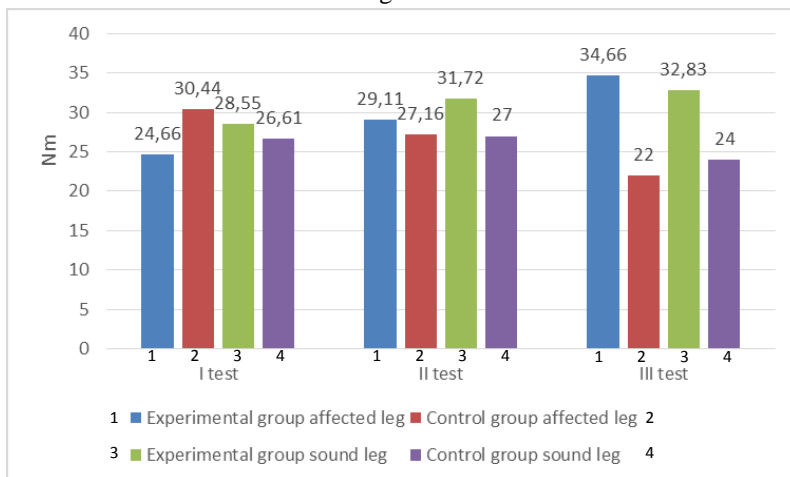


Fig. 2. Results of knee extensors strength

Results and conclusions. The research revealed the statistically significant changes between I and III tests in experimental group patients affected leg knee extensors strength (Nm) ($p < 0.05$). Comparing results of experimental and control groups, statistically significant difference was found in experimental group of patients in the affected leg, three months after the study ($p < 0.05$) (Fig. 2). Similar results were found evaluating changes of knee flexors muscle strength.

Analyzing results of experimental group patients affected leg knee extensors muscles average total work (J) a significant change was found between I and III tests ($p < 0.05$). However the statistically significant improvement of sound leg knee extensors results were found between II and III tests ($p < 0.05$). Comparing results between groups wasn't found statistically significant difference of leg muscles total work improvement.

Remarks. Isokinetic dynamometer is an appropriate mean to assess the functional status of muscles and to increase their function, which allows appropriate adjustment of the physiotherapy and selection of safe loads.

References

1. Flansbjer U.B., Downham D., Lexell J. Knee muscle strength, gait performance and perceived participation after stroke // Archives of Physical Medicine and Rehabilitation. 2006. Vol: 87, Issue: 7. –P. 974–80.
2. Sekhar P.K.C., Madhavi K., Srikumari V., Rao P.A. Efficacy of isokinetic strength training and balance exercises on lower limb muscles in subjects with stroke // International Journal. 2013. – ijmhr.or.

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The survivals after a stroke become disabled due to motor disorders. Using an isokinetic dynamometer or conventional physiotherapy in patients after stroke muscles strength and muscles endurance have increased during the training. However were found better results of muscles strength after 3 month in group of isokinetic training.