

## ASSESSMENT OF RECOVERY BALANCING STROKE PLATFORMS THROUGH POST BAROPODOMETRY

*Danelciuc Francisc Tadeus<sup>1</sup>, Danelciuc Elena Mihaela<sup>2</sup>, Betiuc  
Mihail<sup>3</sup>*

*<sup>1</sup>Chronic neuropsychiatric hospital –Siret, Romania*

*<sup>2</sup>Center for Inclusive Education School Suceava, Romania*

*<sup>3</sup>Social Assistance and Child Protection Suceava, Romania*

**Keywords:** *evaluation, recovery, balance, stability, physiotherapy device.*

**Abstract:** *Coordination abilities manifest in different forms, one being the ability to balance, having a major role in the static, walking, the daily activities of persons after stroke. The study aims to highlight the benefits that can offer an appropriate and judicious use equipment to recover people after stroke, both to assess the balance with electronic baropodometry and training (recovery) of physiotherapy devices using the MBT .*

### **Introduction**

In all modern human communities cerebrovascular disease (the stroke, in this case) have become a major health problem, reaching to register as a third of the death causes, and their survivors remain severely marked, requiring care and recovery for a long period of time.

The role that balance plays in recovery (static, walking, etc.) is recognized by most specialists in medical recovery. Balance is a component in coordination capabilities, being organized as a system, by Blume (1981), quoted by R. Mano (1992). The ability of an individual's balance, as part of coordination capabilities, is conditioned by peripheral sensory receptors, by how permanent they transmit environmental information to position the body segments to the entire body (Sbenghe,2002, p.376).

Due to factors disrupt, the balance can be altered or lost; his recovery is possible through a complicated mechanism for the postural control's exercise, due to control selection and adjustment schemes muscle (Sbenghe, 2002, p. 337).<sup>1</sup> After the same author, postural control is achieved using three primary sources of information: sensitive somatosensory receptors (extero or proprioceptoris), visual receptors and vestibular receptors.

The stability of a body depends on factors such as the projection center of gravity position to the surface, weight and height of center of gravity to the supporting surface (Hay, 1980, pg.154-157).

Maintaining balance a certain period of time depends on many factors, some of which are genetically conditioned, reflexes with an important role in this respect (Bota, 2002, pg.391- 393). Stability can be developed both through exercises designed for this purpose and transfer (induction) through exercises used for purposes other than improving balance.

### **Materials and methods**

According to studies, MBT has a significant potential to muscles training, needed in the state and especially the one around the ankle which may present a particularly high instability in supination and plantar flexion. This study aims to determine the effectiveness of MBT as therapeutic training; in cases of postural instability (medium and long term results) is far superior to conventional therapies.

20 subjects aged 45-60 years, diagnosed with hemiparesis (balance the recovery stage) were randomly assigned to two equal groups: one active treatment (with MBT) and a control group (without MBT). The active treatment followed by 45 minutes daily for a period of five weeks with physical therapy sessions in which MBTs have been used for various exercises, positions. (fig. 1; 2)



**Fig. no. 1**



**Fig. no. 2**

The control group followed the same program of physical therapy (rehabilitation); exercise is traditionally performed (using the drawing board balance, air mattresses, etc.), soft, unstable surfaces without MBT. (fig. 3; 4)



**Fig. no. 3**



**Fig. no. 4**

The active treatment group had to wear MBTs for a period of 1.5 months (6 weeks) during daily activities as much as possible. At the same time, the control group had a daily home training program established by physiotherapists. The two groups were examined and biomechanical and functional parameter were recorded: a) before the start of kinesiology, b) after 3 weeks of therapy, c) at 1.5 months. Parameters were measured, via support some or bipodal baropodometry and muscle strength evaluation test.

1. Analysis of some or bipodal support allows:

- view and monitor the maximum pressure exerted at the plant in static state, each point of the footprint corresponds to a certain percentage of the maximum pressure, so can be spotted and quantified areas of hypo or hypersupport;

- identification of the static weight status;

2. Test muscle strength assessment in the affected leg;

### **Results:**

The assessment carried out through electronic baropodometry (baropodometric platform) were obtained through fingerprint data on

static (static state assessment). The relationship between the plantar surface and surface support.

Plantar surface static analysis allows detection dissymetry able support.

**Table no.1** The pressure in a static position of the legs

SUBJECTS	The control group - free MBT		The experimental group- by MBT	
	<i>INITIAL</i>	<i>FINAL</i>	<i>INITIAL</i>	<i>FINAL</i>
EVALUATION				
MI healthy	62,2 %	58,7 %	62,8 %	54,1 %
MI affect	37,8 %	41,3 %	37,2 %	45,9 %

**Table no. 2** Pressure in static position - the distal foot (peak)

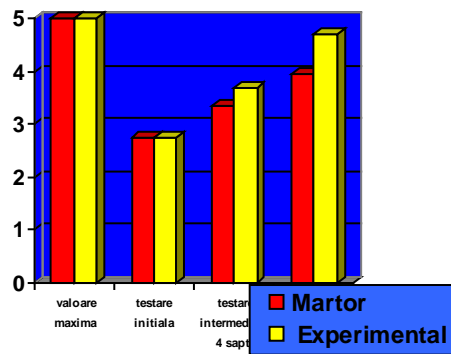
SUBJECTS	The control group - free MBT		The experimental group- by MBT	
	<i>INITIAL</i>	<i>FINAL</i>	<i>INITIAL</i>	<i>FINAL</i>
EVALUATION				
MI healthy	33,2 %	29,5 %	33,6 %	28,6 %
MI affect	20,7 %	23,5 %	20,9 %	22,7 %

**Table no. 3** Pressure in static position - the heel

SUBJECTS	The control group - free MBT		The experimental group- by MBT	
	<i>INITIAL</i>	<i>FINAL</i>	<i>INITIAL</i>	<i>FINAL</i>
EVALUATION				
MI healthy	29 %	29,2 %	29,2 %	25,4 %
MI affect	17,1 %	17,8 %	16,3 %	23,3 %

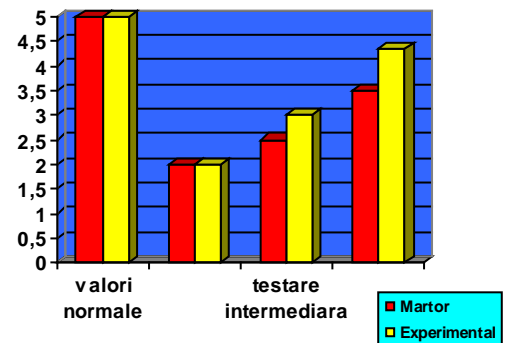
After processing the recorded data through electronic baropodometry shows that subjects who performed post-stroke rehabilitation treatments with MBT physiotherapy devices, the average percentage of pressure exerted by the legs to final testing decreased from baseline. Subjects who received treatment recovered without MBT devices had an average percentage of lower pressure (4-5%) than experimental group subjects. This means that the equilibrium reflex reaction to correct the balance, is higher in subjects who were treated using MBT devices.

Comparing the results achieved in the two tests of muscle strength that the muscle strength had higher values in subjects who performed treatment MBT recovery devices.



**Fig. no. 5**

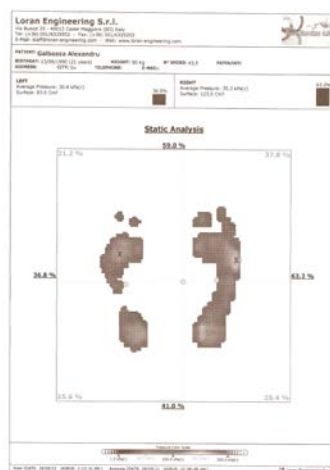
Dynamic muscle strength development in the the affected leg muscle trunk



**Fig. no. 6**

Dynamic evolution of strength

To illustrate the analysis shown below the presence of a patient, baropodometric experimental group recorded before and after course of treatment that were applied kinesiology programs using experimental devices MBT physiotherapy.



**Fig. no. 7 - before treatment**



**Fig. no. 8 - after treatment**

Comparative analysis of data obtained through this testing shows a significant improvement in the values obtained after treatment (fig. no. 8) compared with values obtained before treatment (fig. no. 7), which indicates the effectiveness of the program carried out using MBT physiotherapy devices to control posture daily activities that is the ultimate goal of recovery post stroke patients.

### **Conclusions and proposals:**

Like other devices, methods of assessment of the balance, baropodometrical testing platform can provide important data on the evaluation of postural balance. These data allow us to perform analysis on the state of training, the manifestation of the balance parameters.

Particularly important as the treatment (recovery) after stroke, balance can be recovered. Treatment (recovery) are classical solutions and new technology gives us this (otherwise) opportunities. Finding new methods and equipment helpful in recovering balance, post stroke statics must be a constant concern of specialists. Baropodometrical platform and device physiotherapy MBT is a device that can assess and train a possibility of (retraining).

### **Bibliographic references:**

1. BOTA , C., (2002) – Fiziologie generală, Aplicații la antrenamentul fizic, Editura Medicală, București (pg. 391);
2. CORDUN, M., (2009) – Kinantropometrie, Editura CD Press, București, pg. 203-206;
3. HAY, J., (1980) – Biomechanique, Edition Vigot, Paris, pg.154;
4. ONOSE, G., (2008) – Compendiu de neuroreabilitare la adulți, copii și vârstnici, Editura Universitară “Carol Davila”, București, pg. 231;
5. ROBERTS, T.D.M., (1979) – Neurophysiology of postural mechanisms – London, Butterworths: 118-121;
6. SBENGHE,T., (2002) – Kinesiologie – Știința mișcării, Editura Medicală, București, pg. 263; 376-395.

**Titlu:** Evaluarea în recuperarea echilibrului la persoanele post avc prin intermediul baropodometriei.

**Cuvinte cheie:** evaluare, recuperare, echilibru, stabilitate, dispozitiv de fizioterapie.

**Rezumat:** Studiul efectuat și-a propus să evidențieze avantajele pe care poate să le ofere un echipament adecvat și judicios utilizat în recuperarea persoanelor post AVC, atât pentru evaluarea echilibrului cu ajutorul baropodometriei electronice cât și antrenarea (recuperarea) lui prin utilizarea dispozitivelor de fizioterapie MBT.

**Titre:** Evaluation à la récupération après un AVC équilibre plates-formes par le biais baropodometriei.

**Mot-cle:** l'évaluation, la récupération, l'équilibre, la stabilité, appareil de kinésithérapie.

**Resume:** L'étude vise à mettre en évidence les avantages que peut apporter l'équipement approprié et correctement utilisés chez les personnes post-récupération de l'AVC, à la fois pour évaluer l'équilibre avec électronique baropodometriei et de la formation (récupération) des dispositifs de physiothérapie utilisant MBT.