APPLICATION POSSIBILITIES OF EXERCISE WITH BALANCE TRAINING AIDS IN PATIENTS AFTER SPINAL SURGERY

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Abstract: *The aim of this study is to detect efficiency of kinesiotherapy with balance training aids in patients after the lumbar spine surgery and also familiarization with the use of balancing aids in connection with the activation of the deep stabilization system. The examined group consisted of 50 probands after lumbar spine surgery divided into two heterogeneous groups. In the first group was applied kinesiotherapy without balancing aids and in the second group kinesiotherapy using balancing training aids. We compared the activation of the deep muscle system in the both groups using assessment tests before and after therapy. Evaluating the results, we can state that the unstable platforms may accelerate and improve the quality activation of the deep stabilization system compared to exercises on stable platforms. It means that kinesiotherapy on balance training aids becomes more efficient than exercise on stable platforms. It is suitable therapy and also possible prevention of the development and progression of functional and degenerative changes in the lumbar spine.*

Key words: *balance training aids, deep muscle system, kinesiotherapy, lumbar spine.*

1 Introduction

The functional disorders and diseases of the spine vertebrogenic the rehabilitation meet the ever increasingly in younger age groups. Functional disorders and degenerative diseases of the spine in clinic form one of the largest groups of diseases. Vertebrogenic disease in most countries of the European Union for the 5th-6th site causes of hospitalization. In different countries account for 20% -30% of sick leave and about 50% of pension decisions as a result of just diseases (Nechvátal, 2009). Problems of the vertebrogenic disease present a complex and the solution involves a multidisciplinary approach neurologist, neurosurgeon, rehabilitation physician, physiotherapist and psychologist. Diagnosis and treatment

discopathy is constantly improving and new opportunities to further facilitate the effectiveness of therapy of these diseases.

Subjects of our research were patients after surgery disc herniation in the lumbar spine. The aim of our study was to assess the effectiveness of physiotherapy with balancing devices and also highlight the possibility of using balancing devices in conjunction with the activation of the deep stabilizing system. The paper is aimed on comparison of the effectiveness of two kinesiotherapeutic methods.

2 Aims

The aim of the study was to assess the effectiveness of physiotherapy with balancing devices in patients undergoing lumbar spine while approaching the use of balancing devices in conjunction with the activation of the deep stabilizing system. Within the working methods, we compared the activation of the deep stabilizing evaluation of the therapy using balance equipment and without, in patients undergoing disc herniation in the lumbar spine.

3 Characteristics of Sample

The examined group consisted of 50 patients (21 females and 29 males) aged 35-50 years (mean age 42.7 years) after surgery disc herniation in the lumbar spine. The criterion for inclusion in the study was the time period of operation, a minimum of three months and a maximum of 12 months, and was subject to the current state of the patient.

Exclusion criteria were: patients with acute painful and inflammatory conditions, patients with loss of superficial and deep sensitivity, patients with CNS diseases with symptoms of increased spasticity and patients with dizziness. Patients were used rehabilitation program with an overall duration of 4 weeks.

Female surveyed sample consisted of 9 women aged 35 to 39 years, 5 women aged 40 to 44 years and 7 women in the age group 45 to 50 years.

Male surveyed sample consisted of 11 men aged 35 to 39 years, 8 men 40 to 44 years and 10 men aged 45 to 50 years. Most participants of both sexes were in the age group 35-39 years (see Chart 1).

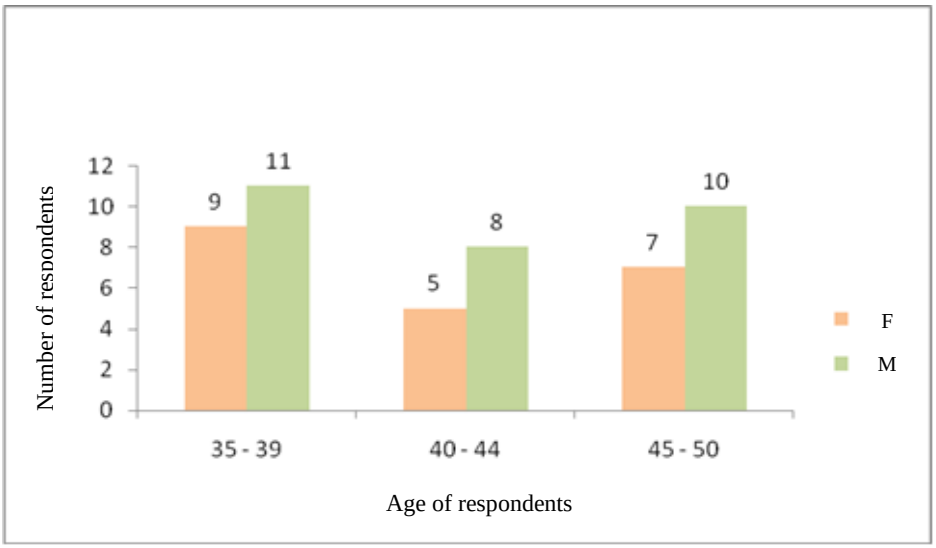

Figure 1 *Overview of age of respondents, depending on their gender*

2.1 Methodology of work and research methods

To determine the activation of the deep stabilizing system (DSS), we used specific tests based on "Australian schools" (Palaščáková, 2010). Using medical manometer, we monitored the position of the lumbar spine and we surveyed by changing the pressure on the spine muscle activation in DSS. Each patient has input and output control examination.

Patients were divided into two groups of the same number of persons. We have identified the group A and group B. Group A absolved classical kinesiotherapy without balance aids and group B absolved kinesiotherapy using devices Balance: Fit balls, Bosu®, over ball, inflatable Balance Trainer lentils Flowin®. Each group had its own specific intervention motion program, which lasted four weeks, included exercise of 3-4 units per a week for a period of 25 minutes. The programs are designed to properly position of the lumbar spine, activating of DSS, to stability improving, coordination and balance improving. Before starting the exercise, the patient was instructed by a physiotherapist about the importance of exercise and breathing during the practicing.

In group A we applied a set of 14 exercises positions' slight on the back, the abdomen's slight, position and standing on four was applied. In supine, subjects completed 6 exercises, lying on stomach completed 4 exercises, in kneeling position 3 supported exercises and 1 exercise in standing position.

In group B, we implemented a specific program, which included 19 stretching, mobilization, and stabilization of exercise and fitness units. Before exercising the respondent was familiar with balancing devices that should be used during therapy. All exercises were performed slowly, with emphasis on proper breathing.

4 Results

4.1 Testing the stabilizing function of m. tranversus abdominis and m. obliquus internus abdominis lying on stomach

Figure 2 compares the results of input and output test group A with group B. Analysis of the results of the stabilizing function m. tranversus abdominis and m. obliquus internus abdominis testing - lying on stomach, we found that the group of participants without balancing devices (group A) showed improvement in the activation of those muscles in 6 of 25 participants, what presents as a 24% success rate. Participants by balancing devices (group B) showed improvement in 14 respondents out of 25 what presents 56% success rate. On this basis, we can conclude that the patients in postoperative lumbar spine recovering, after the applied balancing devices, activated DSS better in the evaluation of lying on the stomach, than participants who did not practice with balancing devices.

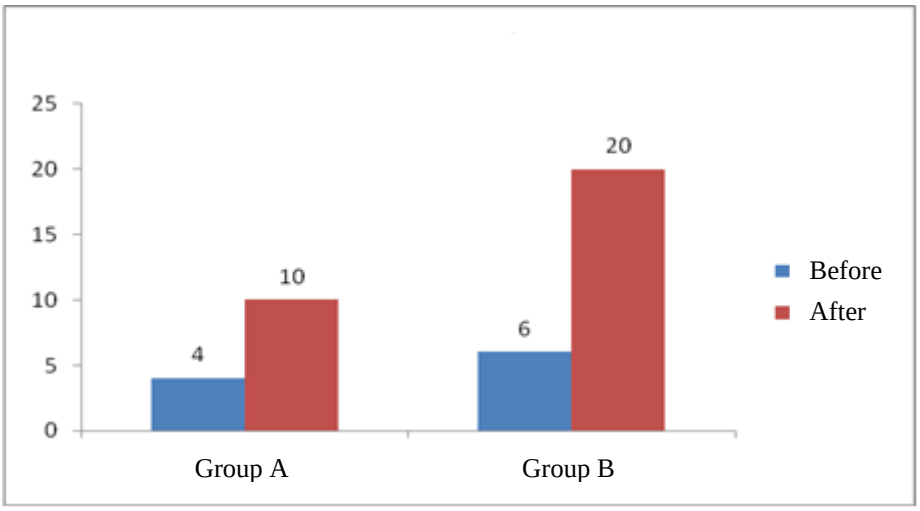

Figure 2 *Comparison of results of Testing the stabilizing function of m. tranversus abdominis and m. obliquus internus abdominis lying on stomach*

4.2 Testing the stabilizing function of m. tranverzus abdominis supine

Figure 3 compares the results achieved in the input and output monitoring of subjects of group A and group B. The analysis of the results of testing the stabilizing function m. tranversus abdominis supine, we found out, that in a group of subjects without the TA balancing devices (group A) showed improvement in the activation of these muscles in 6 out of 25 tested as a 24% success rate. In group B subjects with the TA by balancing devices, we found improvement in 15 of 25 tested, the percentage is 60%.

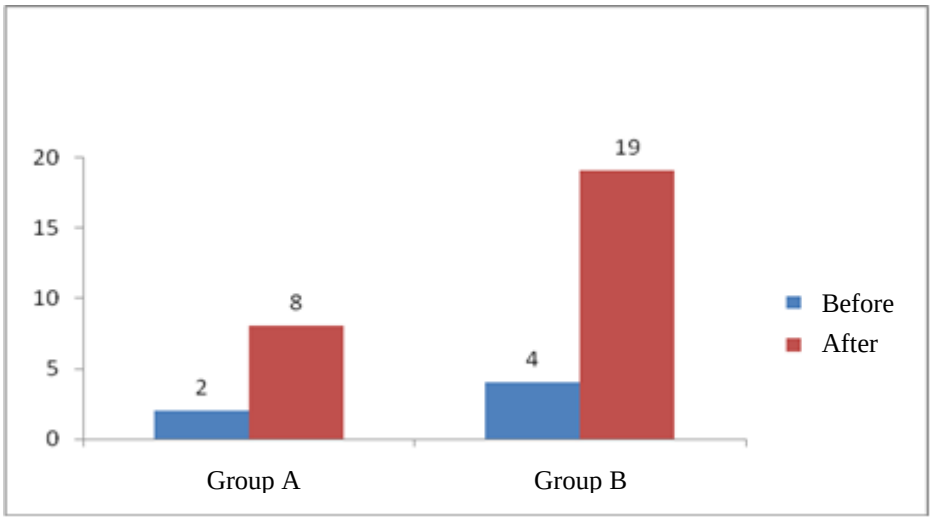

Figure 3 *Comparison of the results of the input and output test activation DSS supine*

4.3 Testing the stabilizing function of m. tranverzus abdominis supine combined with the elevation of the lower extremities

Figure 4 describes the comparison of input and output testing stabilizing function m. tranverzus abdominis supine combined with the elevation of the lower limbs in Group A respondents and respondents in group B. In group tested, the TA without balancing devices has improved in 7 subjects of 25, which is 28%. In subjects with the TA balancing devices (group B) showed improvement in 12 of 25 tested, the percentage is 48%.

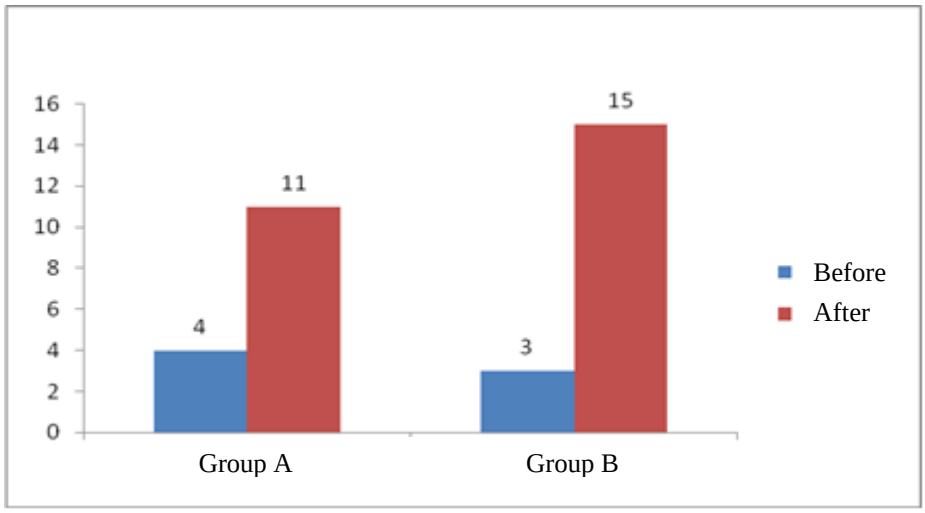

Figure 4 *Comparison of the results of the input and output test activation DSS on supine with elevation of the lower limbs*

4.4 Testing of the deep stabilizing system (DSS) sitting in a strain of lower limb

Figure 5 compares the results of the input and output testing m. tranverzus abdominis in one sitting with strain DK in Group A and Group B. Participants the TA without balancing devices (group A) showed improvement in 7 of 25 subjects which is 28%. For the test to which it was applied kinesitherapy with balancing devices monitor improvement in 12 of 25 subjects which is 48%.

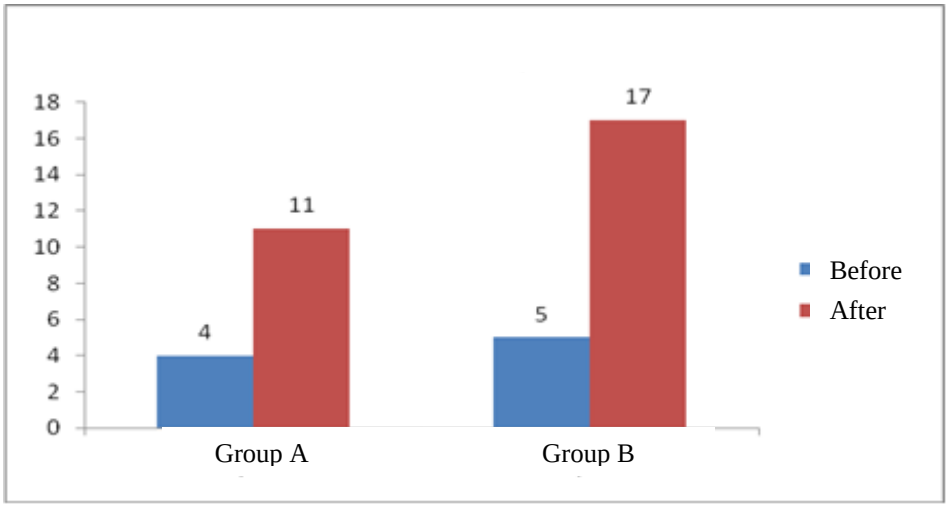

Figure 5 *Comparison of the results of the input and output test activation DSS sitting in a strain of lower limb*

4.5 Testing of the deep stabilizing system (DSS) standing the strain of lower limb

Figure 6 compares the results of the input and output test activation DSS standing with strain of lower limb. Participants without the TA balancing devices (group A) we have seen improvement in 2 of the 25 participants representing 8%. In the patients on the TA balancing devices (group B) was monitored the improvement of activation DSS in 3 of the 25 respondents representing 12%.

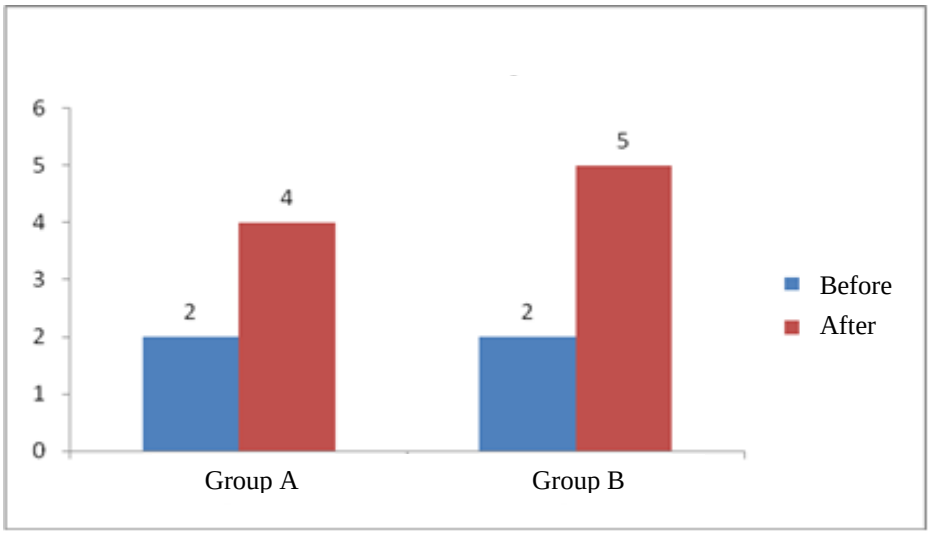

Figure 6 *Comparison of the results of the input and output test activation DSS in standing position*

5 Discussion

The aim of our study was to determine the effectiveness of physiotherapy using balancing devices in patients undergoing lumbar disc herniation and to highlight the use of balancing devices in connection with the activation of the deep stabilizing system.

Deep stabilizing system activation was evaluated on the test basis, "Australian schools" (Palaščáková, 2010). For both groups of subjects we conducted initial and final testing. After the four week kinesitherapy, we found significant differences between the two groups of surveyed participants. Our findings are consistent with the conclusions of Kolář and Lewit (2005), who emphasize that unstable surfaces result in contrast to the stable to increased activity of deep stabilised system and also to better concentration to exercise. In line with the findings Čepíková (1999), which in its pilot study to monitor the impact of exercise on Rašev unstable platform in patients with idiopathic scoliosis, bad posture and hypermobility, and our results point to the fact that the exercises on unstable platforms greatly affects the activation of the deep stabilizing system. Honová (2012) also concluded that the use of balancing devices positively influences the course of therapy. The facilitation effect also supports the findings of our study. Similarly Campbell (2006) showed faster and better activation of the deep stabilizing system during exercise on unstable surfaces compared with exercise on stable surfaces.

Patients after surgery lumbar disc herniation are influenced by various factors. Kříž (2012) stresses the necessary of continual care in different fields before and after surgery and obvious approach to the patient. In his work he indicates the factors affecting physical

therapy, its success and some of the errors that may occur. It further states that in some workplaces there are universal scheme of progressive load files and exercises no matter what operation was performed. Missing approach to the patient and the treatment is often focused only on the operated leg, although the spine is always treated as a whole.

In practice, we meet with the fact that patients receive different "sets of exercises at home", which are often not tested under professional supervision. Most of the exercises are neutral and completely harmless, but it is not sufficient for vertebrogenic patients consider essential targeted kinesiotherapy designed to strengthen the deep stabilizing system.

6 Conclusions

In the paper were presented the results about which we conclude that after the four week kinesitherapy intervention in patients on the TA balancing devices occurred during testing in a position lying on the stomach, the most significant improvement of 36% compared to a group of patients in which absolved kinesiotherapy without balancing devices. At least we found a significant improvement when tested stand in only 4%. Based on these results, we can define that a kinesiotherapy on balancing devices enables faster and better activation of the deep stabilizing system as kinesiotherapy on a stable surface.

In physiotherapy practice, we should focus more on the diversity of exercise in patients after surgery of the lumbar spine, emphasis on mapping exercises able to help the optimal involvement of relevant muscle groups activating fixation and stabilization of the axial organ**.**

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