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# BRUNKOW EXERCISES AND LOW BACK PAIN

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## Abstract

Brunkow exercises starting with dynamic contraction of hands and feet with fixed point on the wrist or/and heel. Dynamic contraction from the beginning, transferring through kinetic chain, leads to isometric contraction of the group of muscles, which has to be included in the exercise. Starting positions determinates the group of muscles to be trained.

The purpose of this study is to investigate influence of Brunkow exercises on spinal motion improvement and pain relief and to evaluate use of Brunkow exercises, as a routine method for lower back pain in Physical Medicine and Rehabilitation Centres.

Thirty-four patients with symptoms of low back pain were included in study. Patients received a mean of 14,9 treatments with standard deviation of 8,96.

All patients were assessed before and after the treatment for spinal mobility and flexibility as well as pain intensity. All parameters for spinal movements showed statistically significant improvement in patients with low back pain who practiced Brunkow exercise program at the end of treatment in relations to pre-treatment values, with significant difference of  $p < 0,01$  for all motions.

Pain was reduced on VAS for  $X=1,7$  with S.D. 1,97. Difference Test was  $t=6,020$  with significant difference  $p < 0,01$ .

Flexibility of spine increased, so average difference in values before and after treatment for Shober test was 0,5 cm with SD 0,65. Difference test was  $t=3,794$  with significant difference  $p < 0,01$ .

Brunkow exercises for low back pain are beneficial treatment for increasing flexibility and mobility of spine and improving the pain.

**Key words:** Brunkow exercises, low back pain, spinal mobility

## Introduction

Therapeutic approaches in treating low back pain are different and very often controversial. In general, physiotherapy treatments for low back pain, can be sorted in "passive" treatments, such as thermo and cryo procedures, manipulation, massage, orthosys, traction and electrothera-

py, and "active" treatments like kinesitherapy procedures. There are different types of exercises for back pain, such as flexion exercises, extension exercises, or some specific exercises that are combination of these two types. Decision which type of exercises can be applied is very individual, depends of physician's approach and there is no prescription which one is the most appropriate for each patient. (1-10)

Exercise is typically aimed at strengthening back extensors or flexors and increasing back flexibility to reduce injury risk, improving mood and pain perception to reduce the impact of injury. (11-15)

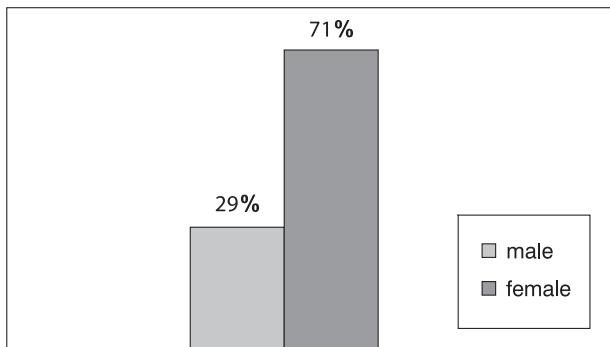
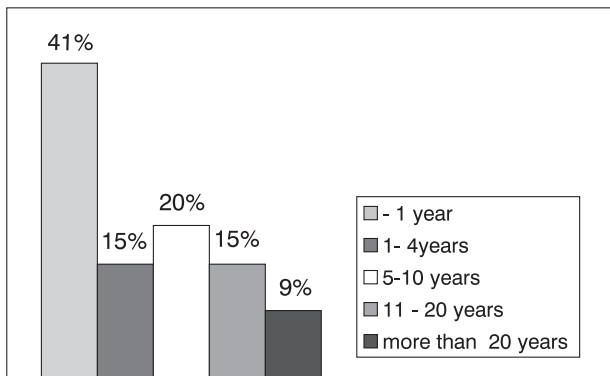
Brunkow exercises (16) can be called "pushing exercises" and they can be done in all starting positions. They are starting with dynamic contraction of hands and feet with fixed point on the wrist or/and heel. Dynamic contraction from the beginning, transferring through kinetic chain, leads to isometric contraction of the group of muscles, which has to be included in the exercise. Starting positions determinates the group of muscles to be trained.

The purpose of this study is to investigate influence of Brunkow exercises on spinal motion improvement and pain relief in patients with symptoms of low back pain. Although Brunkow exercises are isometric exercises, and their main goal is strengthening paravertebral muscles we were interested in their influence on improvement of spinal mobility, flexibility and pain relief. The aim was also, to evaluate use of Brunkow exercises, as a routine method for lower back pain in Physical Medicine and Rehabilitation Centres.

## Methods

### Participants

Thirty-four patients with symptoms of low back pain were included in study, which was approved by the Ethics Committee of the Sarajevo University Faculty of Medicine. Patients were recruited from Physical Medicine and Rehabilitation outpatient Clinic in Community Based Rehabilitation Centers in Sarajevo and from University Clinical Center Sarajevo - Institute for Physical Medicine and Rehabilitation. Subjects were referred for physiotherapy treatment from Primary Health Care physicians or from specialist Clinic (orthopedic, traumatology, neurology etc). Patients with lower back pain, but without motor or

**Figure 1.** Gender structure of participants who exercised Brunkow program for low back pain**Figure 2.** First symptoms of low back pain in participants in the study

sphincter deficit were included in the study. Professionals who had minimal training in Brunkow method did instruction for exercises and supervision of patients.

### Measures

All patients were assessed before and after the treatment. Spinal range of motions were measured using centimeter and measuring a distance between top of the third hand finger and floor while patient were asked to move forward, backward and on right and left lateral side..

Visual Analog Scales (VAS) were measured and recorded as numeric rating scales (0-10). VAS was given to each subject to show his pain intensity on scale graded from 0 to 10, where grade 0 means that patient doesn't have a pain and grade 10 is sign for the worst possible pain. The patient marks a certain length of this line that was equiv-

**Table 1.** Stage of pain in Brunkow group of patients.

Stage	BRUNKOW	
	No	%
Acute (1-7 days)	3	9
Subacute (8 days - 7 weeks)	17	50
Chronic (more than 7 weeks)	14	41
<b>Total</b>	<b>34</b>	<b>100</b>

alent to the intensity of pain experienced. The distance of this mark from "no pain" end of the scale was measured. Shober test was used for measuring flexibility of spine. While patient was in standing position, a horizontal line on the level of edge of iliac bones was marked, and second line 10 cm proximal and parallel with first one. In normal spinal condition, this space increasing for 5 centimeters more, so difference between lines will be 15 centimeters. If patient has pain in lower back, his spinal movements are limited by pain, and Shober test has decreased values. Shober test values before and after the treatment can show results of treatment.

### Exercise Therapy

Brunkow exercises were performed individually according to need and possibility of each patient.

Patients attended exercise program daily, under supervision of physiatrist and physiotherapist in the Clinic for Physiotherapy and Rehabilitation, and they were asked to do the same exercise program at home - five times a day in series of 5 to 10 repetition each time, depending of stage of disease and pain intensity.

Type of exercises and number of repetitions in each session were created individually for each patient.

Starting positions for Brunkow exercise program gradually increase pressure on vertebra (prone position, standing, supine position and sitting). The training contraction was performed as a maximal contraction held for 5 seconds, followed by a rest for 1 minute.

### Statistics

Results were expressed as mean +/- SD. Differences in-group means were examined by Student t- test.

### Results

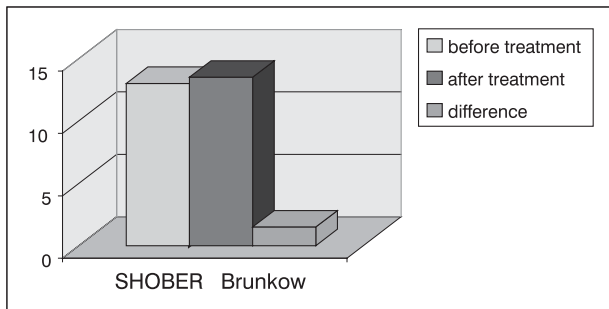
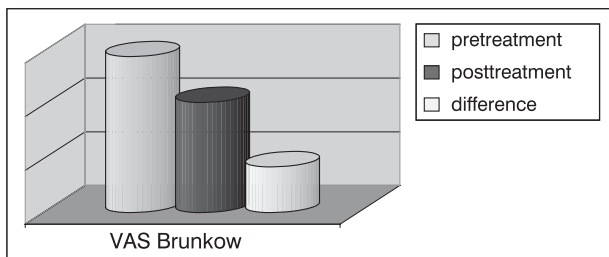
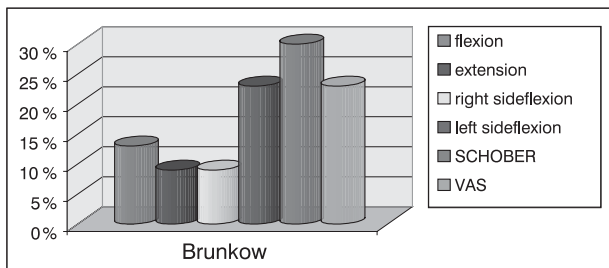
A total of 13 men (38%) and 21 women (62%) participated in this study. Mean age was 42 years (+/- 13,8 years) - error of 2,36. (Figure 1.)

41% of patients experienced first symptoms of lower back pain in the year of assessment, 15% has 4 years experience of pain, 20% 10 years and 26% more than 10 years. (Figure 2.)

According to Quebec Task Force of Spinal Disorders (24) all patients were grouped in 3 groups: acute stage of disease -pain less than 7 days, subacute stage - pain from 8 days to 7 weeks and chronic stage - pain more than 7 weeks. There were 9% of participants in acute pain, 50% in subacute and 41% in chronic pain in Brunkow group. (Table 1.)

Patients received a mean of 14,9 treatments with standard deviation of 8,96. Three patients didn't complete the treatment. No adverse effect occurred.

Thus, 31 patients were enrolled into the statistical analysis.

**Figure 3.** Shober test before and after Brunkow exercises in patients with low back pain**Figure 4.** Pain intensity measured by Visual Analog Scale (VAS) before and after Brunkow exercises in patients with low back pain**Figure 5.** Patients without improvement after Brunkow exercise program

### Data analysis

Measurements of spinal movements and flexibility of spine showed significant improvement in all patients with lower back pain after exercising Brunkow program. Average measurements (X) for Shober test before treat-

ment were 13,0 with standard deviation (SD) 2,33 were increased after treatment to  $X = 13,5$  and SD 2,12.

Average difference in values before and after treatment was 0,5 cm with SD 0,65. Difference test was  $t=3,794$  with significant difference  $p<0,01$ . (Figure 3.)

All parameters for spinal movement showed improvement after exercising Brunkow program for lower back pain. (Table 2.)

Difference in measurements before and after treatment showed that flexion increased for 3,4 cm in average, extension for 1,7 cm; right side flexion for 2,0 cm and left side flexion for 2,2 cm in average. All of these parameters showed statistically significant improvement at the end of treatment in relations to pre-treatment values, with significant difference of  $p<0,01$ .

Mean pain intensity was reduced significantly as a result of treatment.

Pain intensity pre-treatment, on VAS was in average  $X=5,8$ , with S.D. 2,01 and at the end of treatment was decreased to  $X=4,1$  with S.D. 2,25.

Pain was reduced on VAS for  $X=1,7$  with S.D. 1,97.

Difference Test was  $t=6,020$  with significant difference  $p<0,01$ . (Figure 4.)

Intensity of pain (VAS) showed that among 31 patients who exercises Brunkow program for low back, 7 patients pain didn't have pain relief (23%).

Comparing pre-treatment and post-treatment data in all participants, it was found that among 31 patients who performed Brunkow exercise program for low back pain 9 patients didn't have any improvement in spinal flexibility, so values of Shober test were the same before treatment and after the treatment for 30% of participants in this study. Spinal mobility score in Brunkow group showed that 13% of patients didn't improve in flexion score, 9% in extension, 9% in right side flexion and 23% in left sideflexion. (Figure 5)

Results in this study showed that Brunkow exercises for low back pain was beneficial for participants in our study but there was certain number of patients who didn't achieve any improvement.

**Table 2.** Spinal mobility before and after Brunkow exercise program in patients with the low back pain.

Motion	Statistics	Pre-treatment	Post-treatment	Difference	t	P
Flexion	X - average	24,2	20,8	3,4	t=4,593	p<0,01 signif.
	SD - standard deviation	20,8	19,3	4,7		
Extension	X	62,5	60,8	1,7	t=5,118	p<0,01 signif.
	SD	5,7	6,0	1,8		
Lateroflexion right	X	49,9	47,9	2,0	t=6,909	p<0,01 signif.
	SD	6,2	6,6	1,6		
Lateroflexion left	X	50,2	48,0	2,2	t=5,519	p<0,01 signif.
	SD	5,8	6,2	2,2		

## Discussion

This study investigated use of Brunkow exercises in the treatment of patients suffering from lower back pain and its influence on pain relief, spinal movements and flexibility of spine.

Kinesiotherapy is an "active" physiotherapy treatment that can be applied to the patients with lower back pain.

Decision which type of exercises can be used is very individual, depends of physician's approach and there is no define prescription to specify type of exercises for different patients and to indicate when they should be applicable. (1-10).

Although Brunkow exercises, as isometric exercises for paravertebral muscles have mainly goal to tone the muscles, we were interesting to their influence on spinal movements, flexibility of spine and pain relief.

Our treatment consisted of one session of exercises daily under supervision of professionals and recommendation for few more sessions at home, depending of pain intensity and general medical conditions of patient. As was recommended, treatment also focused on correcting of body posture. All patients were assessed before and after the treatment and their spinal movements, spinal flexibility and intensity of pain are measured.

Pain was the most impairing symptom in this patients' sample and each patient experienced pain before treatment, average rate of VAS was 5,8 before treatment (on 10 rate VAS). After treatment a significant pain reduction occurred. Comparing pre-treatment and post-treatment results, all participants in this study have pain relief with a difference in VAS of 1,7.

Elasticity of spine, measured by Shober test, also showed improvement at the end of treatment comparing with pre-treatment measurements, with average difference of 0,5 cm. All patients showed some evidence of restricted ROM before the treatment, mostly because of pain limitation.

Spinal mobility measurements were used as a predictor for functional evaluation and pain reduction (more pain relief, better functional results), so this functional test

functioned as a pain provocation test. An improvement in all parameters of spinal motion was seen.

Low back pain is frequently associated with persistent joints stiffness from capsular, ligamentous, or para-articular muscles and tendon contractures, and that is another reason for limited spinal mobility in our participants.(17) Brunkow exercises started as dynamic contraction of distal parts of upper or lower limbs, but they are finishing with isometric (static) contraction of paravertebral muscles. Strong muscle contractions activate muscles' ergo-receptors (stretch receptors). (18) The afferents from the receptors cause endogenous opioids to be released and also cause the release of beta-endorphin from pituitary. These secretions may cause both - peripheral and central pain to be blocked. (19) Reduction of the pain immediately after training has also been reported in some researches done with patients with the low back or cervical pain (20) Increased level of endorphins after training can also decrease activities related pain. Results of this study confirming that Brunkow exercises can decrease the pain and increase spinal flexibility and mobility.

## Conclusion

Brunkow exercises for low back pain are beneficial treatment for increasing flexibility and mobility of spine and reducing the pain.

All participants in this study have pain relief with a difference in VAS of 1,7.

Elasticity of spine, measured by Shober test, also showed significant improvement at the end of treatment comparing with pre-treatment measurements, with average difference of 0,5 cm.

Spinal mobility measurements before and after treatment, showed that flexion increased for 3,4 cm in average, extension for 1,7 cm; right side flexion for 2,0 cm and left side flexion for 2,2 cm in average.

Spinal mobility, flexibility and pain relief in patients with lower back pain, can improve by performing Brunkow program of exercises for lower back pain.

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