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ORIGINAL ARTICLE

Effect of Radial Shockwave Therapy on Spine Mobility

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ABSTRACT

Background and Objective: low back pain has a huge impact on the patient's quality of life and imposes an economic burden on healthcare systems. New possibilities for low back pain treatment have opened up with the implementation of shockwave therapy. The aim of the study was to evaluate the effect of radial shockwave therapy on the lumbar spine mobility.

Methods: a randomized controlled trial was conducted in 75 patients with chronic nonspecific low back pain complaints. Patients were randomized into two groups, depending on their treatment methods. Group I (n=36) received complex treatment with massage and exercise. Group II (n=39) received complex treatment with radial SWT, therapeutic exercise and massage. Flexion and lateroflexion of the lumbar spine were assessed during the study.

Results: according to the data obtained, patients in both groups showed a positive trend by the end of the study in all measurements (p<0,05). Pairwise comparison of the results of groups I and II at each stage of the assessment revealed no statistically significant difference (p>0,05).

Conclusion: shockwave therapy does not improve spine mobility in patients with chronic nonspecific low back pain.

Keywords: low back pain, shockwave therapy, spine mobility

INTRODUCTION

Low back pain (LBP) is the main cause of disability worldwide, has a huge impact on the patient's quality of life and imposes an economic burden on healthcare systems (1-3).

The epidemiology of LBP varies widely in different countries and depends on social norms, local health care approaches, and legislation (4, 5) . The financial implications of LBP among the world's population are international, since the costs of both health care and social support systems are increasing annually (6). The research carried out in Russia shows that 24.9% of patients who received outpatient care were mostly complaining about low back pain (7).

New possibilities for LBP treatment have opened up with the implementation of shockwave therapy (SWT). SWT is a non-invasive therapeutic method based on transduction of electromagnetic waves in acoustic waves in the infrasound range. The main clinical effects of shock waves are analgesic effect, activation of microcirculation and neoangiogenesis, stimulation of metabolic processes, anti-inflammatory effect (8). However, SWT is not widely used for LBP treatment and is still a new method to be studied.

Very few specialists pay attention to the assessment of lumbar spine mobility during treatment with SWT (9). At the same time, many LBP studies have shown that mobility disorder of lumbar spine and lower limbs increases spine load as a whole and reduces its stability (10).

MATERIAL AND METHODS

A randomized controlled trial was performed at I.M. Sechenov First Moscow State Medical University, Moscow, Russia. There was an examination of 112 people of both sexes with LBP complaints who were treated as outpatients between April 2021 and March 2022.

The study included patients who met the following criteria: chronic low back pain (over 3 months), non-specific pain, age between 24 and 60. The exclusionary criteria were the following: specific pain; use of NSAIDs at the time of the study; taking antiplatelet agents at the time of the study; local use of glucocorticoids less than 2 months before the study; pregnancy; an implanted pacemaker; skin diseases in the place of shock wave impact.

Informed consent was obtained following the guidelines of the Institutional Review Board after obtaining an IRB approval for the study (protocol №06-21; dated Apr. 07, 2021).

Patients were randomized into two groups, depending on their treatment methods. Group I (n=36) received complex treatment with massage and exercise. Group II (n=39) received complex treatment with radial SWT, therapeutic exercise and massage. All patients in the study received treatment three times a week, and 15 sessions in total. Group II patients additionally got 4 sessions of radial SWT at the 1st, 5th, 10th and 15th sessions (6000 shocks with 8 Hz frequency and 1.5-2.5 bar pressure).

The flexion of the lumbar spine was measured by Schober test and Toe touch test. A goniometer was used to measure lateral flexion. All measurements were taken before the start of treatment, on 10th day, 21st day, 32nd day and 3 months after the treatment was finished.

MS EXCEL and IBMSPSS 26 application software were used for statistical data analysis. Dynamics in groups were assessed using the Friedman criterion. The dynamics in groups was evaluated using the Friedman criterion. The differences during pairwise comparison of the study groups were assessed using non-parametric Mann-Whitney U test. All obtained differences were considered at a significance level not lower than p≤0.05.

RESULTS

Patients of the two groups were comparable by gender, age, disease duration, weight, pain intensity and mobility measurements, p>0.05 (Table 1).

Table 1: Comparison of groups I and II before treatment (M±SD)

Indicator	Group I	Group II	p-value*
Age (year)	38,86±10,38	36,97±11,28	0,333
Disease duration (months)	24,46±30,12	20,33±27,54	0,697
Weight (kg)	75,30±17,22	72,44±14,00	0,578
VAS (points)	4,11±1,20	3,56±1,48	0,148
Roland-Morris Disability Questionnaire (points)	5,89±2,65	4,49±3,34	0,075
Schober test (cm)	4,88±2,25	4,80±2,08	0,851
Toe touch test (cm)	7,62±9,46	7,18±8,31	0,965
Lateroflection to the left (º)	15,72±4,87	15,90±5,33	0,689
Lateroflection to the right (º)	16,78±4,63	16,14±5,05	0,689

Significant at p-value<0.05

According to the data obtained, patients in both groups showed a positive trend by the end of the study in all measurements, which was proved using the Friedman criterion (p=0.001 for all indicators). On the 10th day of the study in group I, the Schober test rates increased from 4.88±2.25 cm to 5.11±2.03 cm (p<0.05). The distance from the fingertips to the floor in the Fingertip-to-floor test decreased from 7.62±9.46 cm to 4.76±6.71 cm (p<0.05). The assessment of lateral flexion showed an increase from 15.72±4.87° to 16.67±4.07° (p<0.05) on the left and from 16.78±4.63° to 17.44±5.16° on the right (p<0.05). By the same time, group II had the following changes: an increase in the Schober test rates (from 4.80±2.08 to 5.07±2.06 cm); decrease in the distance from the fingertips to the floor in the Fingertip-to-floor test from 7.18±8.31 cm to 6.22±7.55 cm; increased mobility of the lumbar spine when lowering to the left (from 15.90±5.33° to 16.73±5.11°) and to the right (from 16.14±5.05° to 17.11±4.86°).

At the next two stages of the assessment, the positive dynamics in both groups remained. Three months after the end of treatment, there was a slight worsening in the measurement results in both groups, but significant differences compared to pre-study results remained.

Pairwise comparison of the results of groups I and II at each stage of the assessment revealed no statistically significant difference (Table 2).

Table 2: Comparison of groups I and II at all stages of treatment (M±SD)

Measurements	Day 10		p-value*	Day 21		p-value*	Day 32		p-value*	In 3 months		p-value*
	Group I	Group II		Group I	Group II		Group I	Group II		Group I	Group II	
Schober test (cm)	4,93±2,15	5,07±2,06	0,815	5,23±2,12	5,35±2,04	0,851	5,45±2,03	5,58±1,90	0,847	5,11±2,03	5,21±1,90	0,872
Toe touch test (cm)	6,51±8,43	6,22±7,55	0,996	5,30±7,55	5,29±6,82	0,950	3,76±6,20	4,23±5,77	0,532	4,76±6,71	5,12±6,21	0,733
Lateroflection to the left (º)	16,03±4,59	16,73±5,11	0,467	16,36±4,59	17,85±4,69	0,151	17,03±4,44	18,73±4,25	0,080	16,67±4,07	18,06±4,13	0,125
Lateroflection to the right (º)	17,16±4,42	17,11±4,86	0,959	17,75±4,54	17,93±4,65	0,888	18,23±4,55	18,86±4,46	0,503	17,44±5,16	18,12±4,33	0,603

Significant at p-value<0.05

DISCUSSION

Shock waves exposed to tissues improve microcirculation, change the permeability of cell membranes, restore cell ion exchange, stimulate tissue metabolism and excretion of catabolism products, thereby causing an acceleration of regenerative processes (11-13). These effects determine the feasibility of using SWT in patients with chronic nonspecific LBP and, apparently, may indirectly affect joint mobility (14).

Studies evaluating the effect of SWT on joint mobility are small and mostly deal with treat spasticity in patients with cerebral palsy and stroke. For example, Wang et al. (15) assessed the effect of SWT on spasticity in young children (12-60 months). The authors concluded that the method is safe and can be recommended to reduce muscle tone and restore movement in the peripheral joints. Similar conclusions were reached by other authors during the treatment of older patients (16).

The study by Lee et al. (17) proved the therapeutic effect of SWT in patients with adhesive capsulitis, which not only reduces pain, but also increases the range of motion of the shoulder joint.

The paucity of similar studies leaves open the question of the effect of SWT on range of motion in other parts of the body.

CONCLUSION

SWT does not improve spine mobility in patients with chronic nonspecific LBP.

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