

Pharmaceutical care and active treatment in patients with osteochondrosis

Maria Stamova Vakrilova Becheva¹, Stefka Achkova Ivanova²,
 Angelina Georgieva Kirkova-Bogdanova³

¹ Speciality „Rehabilitator“, Medical College, Medical University – Plovdiv, Plovdiv, Bulgaria

² Department of Chemistry and Biochemistry, Faculty of Pharmacy, Medical University – Pleven, Pleven, Bulgaria

³ Department of Medical Informatics, Biostatistics and E-learning, Faculty of Public Health, Medical University – Plovdiv, Plovdiv, Bulgaria

Corresponding author: Stefka Achkova Ivanova (ivanovastefka_pharm@yahoo.com)

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Abstract

According to the International Classification of Diseases, osteochondrosis is included in the group of diseases of the musculoskeletal system, mainly the spine. The mechanism of the disease is expressed in the disturbance of blood circulation, which nourishes the bone, and hence the damage to bone and cartilage tissue.

Objective: This paper aims to present the effect of applied pharmacological and active treatment in 10 patients diagnosed with lumbar osteochondrosis.

Methods: We conducted a comprehensive treatment of 10 patients diagnosed with lumbar osteochondrosis without any neurological symptoms during the period 2017–2020. This pharmacological and active treatment lasted from 15 to 17 days. The intensity of the pain symptoms, the general mobility of the spine, and the mobility of the lumbar spine were measured to determine the deficit of the patients. The strength of the flexor and extensor muscles of the body was tested.

Results: A decrease in pain intensity, increase in the strength of the abdominal and back muscles and improvement of the mobility of the back muscles were found in all patients after the complex treatment. As a result of the therapy, a reduction in the patient's dysfunctions and the risk of developing disabilities was found.

Conclusion: The application of a multidisciplinary approach in patients with osteochondrosis is of great importance for reducing pain intensity and achieving a good functional recovery of motor and stabilizing function of the muscles of the spine.

Keywords

pharmaceutical care, active treatment, osteochondrosis

Introduction

Osteochondrosis is a term used to describe a group of disorders that affect the growing skeleton. These disorders result from abnormal growth, injury, or overuse of

the developing growth plate and surrounding ossification centres. The exact aetiology of these disorders is unknown, but, vascular abnormalities, hormonal imbalances, repetitive trauma, and mechanical factors, may all play a role. (Atanda et al. 2011). Due to the social importance of this

disease, we present the effect of applied complex treatment, including pharmacological care and active treatment in patients with lumbar osteochondrosis.

Patients and methods

We applied pharmacological and active treatment to 10 patients in the age range 58–65 years with lumbar osteochondrosis, without neurological symptoms in the period 2017–2020.

One of the patients had concomitant heart disease. Osteoporosis was found in five of the female patients. Pharmacological therapy with Pregabalin tabl., Rizedronate sodium tabl., Teriparatide ing., Vit K2 in combination with Vit D3 and application of Zoledronic acid ing. (Tsvetkova et al. 2016a, b). No comorbidities were reported in the remaining four patients.

The rehabilitation potential included:

1. Measurement of the pain symptoms using a visual analogue scale /VAS/;
2. Measurements of the spinal mobility including:
 - a. Tom Mayer test giving information about the mobility of the whole spine;
 - b. Schober test giving information about the mobility in the lumbar spine;
3. Manual muscle test assessing muscle strength from 0 to 5, with grade 3 being the functional threshold midway between the complete loss of muscle function (grades 0, 1 and 2) and their normal strength (grades 4 and 5).

Kinesitherapy

Based on the established functional deficit, the goal of the kinesitherapy referred to the maximum restoration of the function of the spine and the affected limb. Tasks of kinesitherapy were to reduce the spasm of the lumbosacral muscles, relax the shortened muscles, maintain and improve mobility in the spine and build a lumbar muscular corset. The kinesitherapy procedures were performed daily for 10 days and lasted about 40–45 minutes.

During the treatment of the patient who received angioplasty in 2018 (Krastev et al. 2020), followed by stent placement (Krastev et al. 2019; Petrov et al. 2020) as a result of acute myocardial infarction (Krastev et al. 2018), we measured the pulse three times during the kinesitherapy session, and we recorded the blood pressure at the beginning and at the end of the procedure.

The kinesitherapy debuted with lumbar massage – rubbing diagonally from the spine to the spina iliaca anterior superior and rectilinear paravertebral rubbing. We applied various non-steroidal anti-inflammatory gels – Diclofenac, Ibuprofen, Ketoprofen during the massage.

We applied joint contraction of the abdominal muscles and m. quadratus lumborum, isometric and isotonic

contractions for m. rectus abdominis and dynamic strength training for m. obliquus abdominis externus and m. obliquus abdominis internus, as well as training for the oblique posterior system consisting from the superficial thoracolumbar fascia. We applied training on a large ball, including exercising the rotators of the torso with the abduction of the upper limb, exercise for proprioception of the torso in flexion of the upper limb and extension of the homolateral lower limb and maintaining a neutral position by moving Swiss-ball on the wall.

We applied postisometric relaxation for m. iliopsoas, m. quadratus lumborum, m. piriformis, m. rectus femoris. We applied isometric contractions for m. gluteus maximus from the occipital leg, as well as exercises from the knee support for cross-training of m. gluteus maximus and m. latissimus dorsi. We used the means to enhance the successive induction. The kinesitherapy procedure included lots of breathing exercises. The dosage of the exercises was small because we took into account the concomitant heart disease.

Data analysis

We used Wilcoxon signed ranks test for two related samples to analyse ordinal data before and after the treatment. We applied the Mann-Whitney non-parametric test to analyse the effect of gender on the studied variables and Spearman correlation to study the relationship between age and ordinal variables. We accepted a level of significance $\alpha = 0.05$.

Central tendencies are presented by a mean value (M) and a standard deviation (SD). The statistical processing of the data was done with IBM SPSS v.19.

Results

Four men and six women took part in the investigation. The mean age of men was 62.25 ± 3.202 years and of women – 61.00 ± 2.098 .

Table 1 presents the mean values of the results from the initial and final testing of the patients. There was a reduction in the intensity of pain after the application of the complex treatment and improvement of the general mobility of the spine. The difference in the mean values of

Table 1. Comparison of the mean values of the results from the initial and final testing.

	1 st test M±SD	2 nd test M±SD	P
Pain intensity	4.50±1.269	1.40±0.699	0.005
Schober test	1.45±0.723	2.65±0.474	0.004
Tom Mayer test	11.20±2.300	5.10±1.370	0.005
<i>Manual muscle testing</i>			
m. rectus abdominis	2.50±0.527	3.50±0.527	0.002
m. obliquus abdominis externus, m. obliquus abdominis internus	2.40±0.516	3.40±0.516	0.002
m. errector spinae	2.40±0.516	3.60±0.516	0.003
m. quadratus lumborum	3.00±0	4.00±0	0.002

mobility in the lumbar spine at the beginning and the end of the test was 1.2, which indicated that the movement in the lumbar spine had improved.

An increase in the strength of the muscles of the body was found in the comparative analysis of the mean values from the muscle testing, as the biggest difference was in the mean initial and final values of *m. erector spinae* – 1.2.

We analysed the influence of gender on the absolute differences between the variables before and after treatment with the non-parametric Mann-Whitney test. We did not find a statistically significant difference in the improvement between women and men (Table 2).

Table 2. Influence of gender on the studied parameters.

	U	P
Pain intensity	7.500	0.309
Schober test	11.000	0.818
Tom Mayer test	11.000	0.823
<i>m. rectus abdominis</i>	12.000	1.000
<i>m. obliquus abdominis externus, m. obliquus abdominis internus</i>	12.000	1.000
<i>m. erector spinae</i>	11.000	0.759
<i>m. quadratus lumborum</i>	12.000	1.000

We analyzed the effect of age on the absolute differences between the variables before and after treatment by Spearman's correlation. There was no statistically significant difference in the improvement of the patients' condition.

When comparing the mean values of the indicators of pain intensity and Schober's test, a statistically significant moderate negative correlation $r_s = -0.702$, $P = 0.024$ was found. The stronger pain intensity was the reason for less mobility in the lumbar part of the spine (Table 3).

Table 3. The relation between pain intensity and Schober test.

Patient	1	2	3	4	5	6	7	8	9	10
Pain intensity	-3	-3	-4	-4	-2	-2	-3	-4	-2	-4
Schober test	1	1.5	2	1.5	1	1	1	1	0.5	1.5

Discussion

As a result of the applied kinesitherapy, an improvement in mobility was found in the various parts of the spine.

The lumbar massage improved trophism, activated and provoked joint receptors. The application of non-steroidal inflammatory drugs through massage in combination with active means of kinesitherapy helped to reduce pain

symptoms, improve joint mechanics and physiological movements (Popov 2009).

The mobility of *m. erector spinae* was improved by applying flexion and extension exercises to the spine (Lee et al. 2019). The main role in increasing muscle strength was played by the exercises with a large ball, which we included in the complex, and their positive effect was due to the possibility of introducing different degrees of instability (Donatelli and Wooden 2009). Due to the instability, therapeutic ball exercises require more effort. Increased muscle activity is observed due to the coactivation of the local and global muscles of the body. This causes increased control and function of the postural muscles by improving proprioception (Becheva and Viteva 2013).

Muscle imbalance was affected by the application of post-isometric relaxation (Lewit and Simons 1984). Cross-training for *m. gluteus maximus* and *m. latissimus dorsi*, contributed to improving lumbar stability (Jeong et al. 2015; Lee et al. 2019).

The kinesitherapy procedure was saturated with breathing exercises to improve the vital capacity. Chest breathing was trained to improve chest mobility, and abdominal breathing helped activate extracardiac factors (Cifu 2015).

Conclusion

As a result of the applied treatment, the pain symptoms of the patients were reduced, which improved the functional condition of the spine, affected the muscle imbalance as a result of improving the strength of the dynamic muscles of the body. The proprioception of the spine was also improved. A reduction in patients' dysfunctions and the risk of developing disabilities was found.

It is extremely important to apply a multidisciplinary approach to achieve a good functional recovery by improving the motor and stabilizing function of the muscles of the spine in patients with osteochondrosis. This will help to optimize all aspects of patients' quality of life.

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