

MANUAL THERAPY AND EXERCISE THERAPY IN PATIENTS WITH CHRONIC LOW BACK PAIN

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(Original scientific paper)

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Abstract

Introduction: Low back pain is not a disease, but a symptom that comes from different processes of building structures of back region. Material and methods: This research was short term with duration of four months and it was a prospective study. From 56 patients, 28 were treated with strengthening only for back muscles together with electrotherapy and thermotherapy (control group); and the other 28 patients were treated with muscular strengthening for back, legs and abdominal region incorporating manual therapy, electrotherapy and thermotherapy (experimental group). The acquired data were grouped according to submitted questions and statistical processing was made with software SPSS, to calculate statistical parameters like structure, median and variable masses. Verification of this trials was made by level of reliability for $p < 0.01$, with error level respectively from 99.7 and $p < 0.05$ and reliability from 95% Results: In the first visit, subjective examination of patients was conducted through questionnaires and objective examination measuring movement, muscular spasm and muscle strength was nearly the same without significant difference between groups, but in final examination after 15 rehabilitating sessions there is remarked significant improvement in group of patients treated with muscular strengthening of back, legs and abdominal region involving manual therapy, electrotherapy and thermotherapy, especially with positive Lasegue test, where in the beginning of the treatment, the percentage of patients with positive Lasegue test was 85.71%, whilst with negative test was 14.28%. After application of muscle strengthening of the back and abdominal region involving electrotherapy and thermotherapy with negative Lasegue test are 78.57%, whilst with positive Lasegue test only 21.42% of patients remained.

Key words: chronic Low back pain, Manual therapy, Exercise therapy

Introduction

Low back pain (LBP) is the fifth most common reason for physician visits, which affects nearly 60-80% of people throughout their lifetime. Low back pain that has been present for longer than three months is considered chronic, although there is still no consensus about the definition of CLBP. Specific causes of LBP are uncommon, and in approximately 90% of patients a specific generator cannot be identified with certainty. (I. Khan, R. Hargunani et al.2014).

Chronic low back pain (CLBP) has been associated with neurochemical, structural, and functional cortical changes (Aure OF, Nilsen JH, Vasseljen O. 2003) of several brain regions including the somatosensory cortex (S. Kälin, A.K Rausch-Osthoff et al. 2016). Complex processes of peripheral and central sensitization may influence the evolution of acute to chronic pain (R. Izzo et al.2015).

Clinically Relevant Anatomy

The lumbar region is situated under the thoracic region of the spine. The lower back consists of five vertebrae (L1- L5). It has a slight inward curve known as lordosis. The fifth lumbar vertebrae is connected with the top of the sacrum. The vertebrae of the lumbar spine are connected in the back by facet joints, which allow for forward and backward extension, as well as twisting movements. The two lowest segments in the lumbar spine, L5-S1 and L4-L5, carry the most weight and have the most movement, this makes the area prone to injury. In between vertebrae are spinal discs, they provide support. Discs in the lumbar region of the spine are most likely to herniate or degenerate, which can cause pain in the lower back, or radiating pain to the legs and feet. The spinal cord travels from the base of the skull to the joint at T12-L1, where the

thoracic spine meets the lumbar spine. At this segment, nerve roots branch out from the spinal cord, forming the cauda equina. Some lower back conditions may compress these nerve roots, resulting in pain that radiates to the lower extremities, known as radiculopathy. The lower back region also contains large muscles that support the back and allow for movement in the trunk of the body. These muscles can spasm or become strained, which is a common cause of lower back pain (Prometheus).

Epidemiology

5-10% of all low back pain patients will develop CLBP. CLBP prevalence rates are lower in individuals aged 20-30 years, increasing from the third decade of life, and reaching the highest prevalence between 50-60 years. However, the prevalence rates stabilize in the seventh decade of life. There's no difference in CLBP prevalence at different periods of the year or in different places (Meucci et al.2015).

There is higher CLBP prevalence in females, people of lower economic status, people with less schooling and smokers. There's indication that prevalence has doubled over time. This may be due to important changes in lifestyle (obesity) and in the work industry. Factors as a family history of disabling back pain, radiating pain, advice to rest upon back pain consultation, occupational LBP or LBP caused by traffic injury are all associated with chronic disabling back pain over lifetime. (Fujii et al.2013). Job satisfaction and psychosocial factors also play a role in the development of CLBP (Patrick et al. 2016).

Musculoskeletal disorders are a comorbid condition strongly linked to CLBP. A moderate association was found when considering the whole musculoskeletal chapter, a stronger association was found when considering the somatoform symptoms related to the musculoskeletal cluster (Ramond-Roquin, Aline, et al.2015).

In patients with low back pain (LBP), alterations in fiber typing in Multifidus and erector spinae are assumed to be possible factors in the etiology and/or recurrence of pain symptoms as it negatively affects muscle strength and endurance. In case of the latter, type I fibers have been argued to be more affected by pain and immobilization than type II fibers (R. Izzo et al.2015).

Clinical Presentation

Most patients that suffer from CLBP experience pain in the lower area of the back (lumbar and sacroiliac regions) and mobility impairment. Pain can also radiate in the lower extremities, or generalized pain can be present. Patients with CLBP can also experience movement and coordination impairments. This could affect the control of voluntary movement of the patients. It can be challenging for the patient to maintain the neutral position, malalignment of the body can occur. It can also be found difficult to maintain a standing, sitting or a lying position, especially in case of radiating pain to the lower extremities. Carrying things in the arms, or bending can also provoke complaints. Daily activities, such as cleaning, sports and other recreational occupations can become a big task for people with CLBP.

The complaints are recurring and occur longer than three months. It is possible that CLBP passes in episodes. Some episodes are more severe than others, but overall the patient is affected by the impairments. Eventually, social contact and work environment will suffer from this great impact on the patient's health and wellbeing.

Prevention

Identifying risk factors allows development of healthcare strategies (and prevention) to reduce the burden of chronic pain. Some risk factors cannot be changed, but others can be modified. Risk factors include socio-demographic, clinical, psychological and biological factors. For example anxiety, depression and catastrophizing beliefs (yellow flags) are associated with chronic pain and with a poor prognosis (Van Hecke et al.2013).

Operant treatment approaches can be integrated into standard pain management for acute/subacute low back pain. Graded activity and behavioral education are promising treatment approaches for the prevention of CLBP and explaining the physiology of pain can also work preventively (Brunner, E., et al.2013).

Physical Therapy Management

Intervention:	Effective	Not effective	Might be effective	Specifications:
Advice			X	Needs to be used as an addition to the treatment
Stretching			X	Only effective for shortened muscles or low mobility caused by muscles
General exercise therapy	X			Has beneficial effects for the management of CLBP
Motor control exercise	X			Seems to be a superior treatment
Sensory discrimination training			X	Not fully developed yet
Traction		X		
McKenzie Method	X			As effective as other exercise therapy
Massage and other named modalities		X		
Pilates / Yoga			X	Yoga: there is some evidence for short-term benefits on functional disability. More evidence is needed for both pilates and yoga
Biopsychosocial rehabilitation	X			Positive long term effects on pain and disability in patients with nonspecific CLBP.

Exercise therapy has been shown to have beneficial effects for the management of chronic low back pain (Mark H. Halliday et al. 2016). Utilization of trunk coordination, strengthening, and endurance exercises reduces low back pain and disability in patients with subacute and chronic low back pain with movement coordination impairments. Moderate- to high-intensity exercise will be considered for patients with CLBP without generalized pain. For patients with CLBP with generalized pain incorporating progressive, low-intensity, submaximal fitness and endurance activities into the pain management and health promotion strategies will be considered (Anthony Delitto. et al. 2012).

Core strengthening exercises: are used to restore the coordination and control of the trunk muscles to improve control of the lumbar spine and pelvis. These exercises aim to restore the strength and endurance of the trunk muscles to meet the demands of control. Core exercise may be more effective than general exercise in relieving pain and improving back-specific function for patients with CLBP in the short term. No significant differences were found in the long term (Wang, X., et al. 2012).

Motor control exercise: motor control exercise protocols have been shown to be an effective treatment of chronic low back pain. Common targeted muscles include transversus abdominis, multifidus, the diaphragm and pelvic floor muscles. The focus of motor control exercises is to improve neuromuscular control of trunk segments involved in movement of the spine (Ferreira ML et al. 2007).

Motor control exercises seem to be superior to several other treatments, such as general exercise (with regard to disability in the short, intermediate, and long-term and pain in the short and intermediate term), spinal manual therapy (with regard to disability during all time periods) and minimal intervention (during all time periods with regard to pain and disability) (Byström, M.G. et al 2013). Instructions: An independent contraction of the deep stabilizing muscles, such as the transversus abdominis and multifidus, facilitated by pelvic floor contraction, which leads to their co-contraction, whilst instructing to control breathing by maintaining resting tidal volumes throughout deep trunk activation maneuvers. Progression is achieved when mastery of contraction in static tasks is achieved. Then move on to implementation of deep muscle contraction during dynamic tasks. Daily practice at home for 30 minutes is instructed (Mark H. Halliday et al. 2016).

Sensory discrimination training: cortical reorganization presents a barrier to successful recovery; however the plasticity that underpins cortical reorganization also suggests that it might be responsive to targeted treatments, such as sensory discrimination training (SDT). SDT comprises tactile discrimination and sensorimotor retraining approaches, which involve the recognition of the location and the type of the

stimuli by the patient (localization training). However, these approaches are not fully developed from a pathoanatomical perspective, since the processes involved in cortical reorganization in CLBP are not fully understood (S. Kälin, A.K Rausch-Osthoff et al. 2016).

Traction: Summary evidence concludes that mechanical lumbar traction is not effective for treating acute or chronic nonspecific low back pain (LBP). Few trials evaluated the effectiveness of treatments for radicular low back pain, but the available evidence showed traction and spinal manipulation were not effective or were associated with small effects (Voloshin, A., and Josef Wosk. 1982).

Mckenzie Method: Has been shown to be as effective as other exercise therapy. Compared to motor control exercises there is no significant difference in pain and function scores. However, patients reported greater improvement in sense of recovery in the short term compared to patients who received motor control exercises. This obviously might differ across different groups of patients (Mark H. Halliday et al. 2016).

Massage and modalities such as electrical nerve stimulation, low-level laser therapy, shortwave diathermy and ultrasonography have not been shown to be effective interventions (Chou R et al. 2007). Exercise focusing on general improvement of strength and cardiovascular endurance is not suggested for optimal outcomes in patients with chronic low back pain (Ferreira ML, et al. 2007).

Pilates: there is inconclusive evidence that Pilates is effective in reducing pain and disability in people with CLBP. More research is necessary (Wells, C., et al. 2013).

Yoga: may be an efficacious adjunctive treatment for CLBP. Strongest and most consistent evidence is there for the short-term benefits on functional disability. More research is necessary (Susan Holtzman and R Thomas Beggs 2013).

Purpose

The aims of the paper are:

1. Evaluation of the degree of efficacy of exercise and manual therapy compared to other physiotherapy procedures.
2. To argue the role of exercise and manual therapy in preventing and eliminating back pain.
3. Identify the risk factors that affect the appearance and re-appearance of back pain.
4. To compare the effectiveness of different methods of physiotherapeutic treatment, the elimination of back pain and the quick return of the patient to daily life activities.

Material and Methodology of Work

The research was conducted in the clinic for physical therapy REHABILITIMi in Podujevo.

Each patient is treated for a period of three weeks with five sessions for week, so fifteen therapeutic sessions have been applied to each patient. This study was conducted through a questionnaire obtained from similar international researches, published and conducted in many countries, on back problems. The research was short-term in four months and prospective. The total number of patients is 56, between the ages of 20 and 65, who suffer from chronic back pain, which are divided into two groups:

a. First group: With only hardening of mm. backhoe, thermotherapy and electrotherapy were rehabilitated 28 persons who make up the control group, while

b. Second group: With hardening simultaneously of mm. backbone, abdomen and foot, manual therapy, thermotherapy and electrotherapy have been rehabilitated by 28 other people who make up the experimental group.

Criteria for inclusion in the research:

1. Males and females aged 20 to 65 years.
2. Backache with a duration of more than 4 months.
3. Back pain patients who have no other health problems.

Its assessment:

In the first and last visit, all the patients have completed the questionnaire and are examined clinically.

These data are processed and compared for each visit.

1. The used questionnaire was obtained from: "Fainbanks CT, Couper C, Davies JB, The Overseas Back Pain Disability Questionnaire", which surveys the pain during various activities that the patient performs in everyday life.

2. In the clinical examination were checked:

o mobility

- o Regression (muscle spasms)
- o Muscular strength
- o Sensibility

All patients were informed and agreed on the manner and purpose of the research.

Results

The research included 56 patients with chronic back pain who were divided into two groups according to treatment method:

The first group, involving twenty-eight patients (50%), included patients treated with only back muscle strengthening, thermotherapy and electrotherapy. The second group, involving twenty-eight patients (50%), included patients with muscular backache, abdominal and leg muscles, electrotherapy, thermotherapy and manual therapy.

The testing did not show significant difference between the two groups, which means that the groups were the same for the number of research included in $P > 0.05$ (Tab. 1)

Tab 1. The general characteristics of gender

The general characteristics of gender	Treatment of group I		Treatment of group II	
	N	%	N	%
Women	16	57.14%	15	53.57%
Men	12	42.86%	13	46.43%
Total patients	28	100%	28	100%

According to employment - in both groups, the largest number of patients who have had back pain have been those who do static work. Because inactivity and long standing in only one position causes more pain. (Tab. 2)

Tab 2. The general characteristics of working

Working	Treatment of group I		Treatment of group II	
	N	%	N	%
Static work	14	50 %	16	57.15 %
Dynamic work	6	21.42 %	8	28.57 %
1. No work	8	28.57 %	4	14.26 %
Total Patients	28	100 %	28	100 %

Results of Subjective Examination

This chapter presents the results of the examiners and some of the subjective data of patients with both methods of treatment.

The subjective feeling of total pain intensity in patients of both groups was analyzed according to the treatment methods.

Objective examination results: Here we present the degree of mobility of the neck and muscular strength before and after application of appropriate physical therapy and comparisons between these treatment methods.

Evaluation of muscle strength for back muscles before and after treatment

Tab 3. Intensity of pain before and after the treatments

Intensity of pain	Treatment of group I				Treatment of group I			
	Para		Pas		Para		Pas	
	N	%	N	%	N	%	N	%
No pain	0	0.00%	0	0.00%	0	0.00%	5	17.86%
Little pain	0	0.00%	1	3.57%	0	0.00%	10	35.71%
Average pain	3	10.71%	22	78.57%	5	17.85%	13	46.43%
Severe pain	24	85.71%	5	17.86%	16	57.14%	0.00	0.00%
Extreme pain	1	3.57%	0	0.00%	7	25.0%	0	0.00%
Total patients	28	100 %	28	100%	28	100%	28	100%

Tab 4. The muscular force for back muscle before and after the treatment

Muscle strength Back muscle	Treatment of group I				Treatment of group II			
	before		after		before		after	
	N	%	N	%	N	%	N	%
Weak (n 2)	3	10.71	0	0.00	8	28.57	0	0.00
Good (n 3)	25	98.29	23	82.14	17	60.71	0	0.00
Very good (n4)	0	0.00	5	17.86	3	10.71	21	75
Normal (n5)	0	0.00	0	0.00	0	0.00	7	25
Total patients	28	100	28	100	28	100	28	100

The Muscular Strength for Abdominal Muscle Before and After the Treatment

Strength and mm. backbone - Group I - before and after the application of the therapy we have this classification of muscular strength: three patients with weak strength (grade 2), now we have no more, twenty-five patients with good strength (grade 3) and after treatment we have twenty-three, while five patients have gone to gr. with very good muscular strength (grade 4).

Group II - before and after the application of the therapy we have this classification of muscular strength: eight patients with weak mastitis (grade 2), after the treatment we have no more, seventeen patients with good muscular seizures (grade 3), now we have only one patient, three patients with very good muscular strength. After treatment we have twenty-one patients with very good muscular strength (grade 4), and seven patients have gone to gr. with normal muscular strength (grade 5) . (Tab. 5.)

Tab 5. The muscular force for abdominal muscle before and after the Treatment

Muscle strength (Abdominal muscle)	Treatment of group I				Treatment of group II:			
	before		after		before		after	
	N	%	N	%	N	%	N	%
Weak (n 2)	9	32.14	0	0.00	0	0.00	0	0.00
Good (n 3)	17	60.71	20	71.42	24	85.71	3	10.71
Very good (n4)	2	7.14	7	25	3	10.71	6	21.42
Normal (n5)	0	0.00	1	3.57	1	3.57	19	67.86
Total patients	28	100	28	100	28	100	28	100

Surface sensitivity - in patients whose sensitivity was impaired, the possibility of its recovery was small because most of them had pain for a long time.

In the I-susceptibility group there were no major changes before and after treatment, while in group II we had six patients with impaired susceptibility, and after treatment we had five, with susceptible susceptibility we had twenty-two patients, after treatment we have twenty-three patients. (Tab 6)

Tab 6. Surface sensitivity

Surface sensitivity	Treatment of group I				Treatment of group II			
	before		after		before		after	
	N	%	N	%	N	%	N	%
Saved	21	75	21	75	22	24	24	85.71
Damaged	7	25	7	25	6	4	4	14.28
Total patients	28	100	28	100	28	100	28	100

Llaseg's Lyrics

In group I, the posterior Lasegut test was positive in twenty-three patients, while negative in five patients. After treatment fourteen were with positive test, while the rest were negative, fourteen of them.

In group II, twenty-four patients were positive and four negative. After treatment, twenty-two cases were able to improve (Lasegut test) while six remained with a positive test. (Tab.7)

Tab 7. Laseg test

Llaseg's Lyrics	Treatment of group I				Treatment of group II			
	before		after		before		after	
	N	%	N	%	N	%	N	%
Positive	23	82.14	14	50	24	85.71	6	21.42
Negative	5	17.85	14	50	4	14.28	22	78.57
Total patients	28	100	28	100	28	100	28	100

Conclusion

From the results of our research after three weeks of treating patients with chronic lumbago treated with hardening of mm. backbone, abdomen and legs by incorporating manual therapy, electrotherapy and thermotherapy, compared to only hardening of mm. backpack incorporating electrotherapy and thermotherapy, we conclude that hardening of mm. backbone, abdomen and legs incorporating manual therapy, electrotherapy and thermotherapy (group II) has a significant effect on improving the symptoms and clinical signs of chronic lumbagoes.

Reflection of the muscles of the back, legs, and abdomen has shown very good results in stabilizing, balancing, sustaining and strengthening of the body musculature.

The effect of manual therapy has shown a very positive result in muscle relaxation, increased blood circulation, release of muscular spasms and muscular regurgitation.

Subjective susceptibility of the patients has been significantly improving in the group of patients who have been applied for back muscle, abdominal and leg muscles including manual therapy, electrotherapy and thermotherapy, while nonlinear improvement of the group of patients who have only applied the exercises backpack, electrotherapy and thermotherapy.

Patient education has a very important role in the rehabilitation of patients.

The effect of electrotherapy, ultrasound therapy, thermotherapy, cryotherapy is very much needed in treating back pain

Recommendations: A wider research on long-term will give better picture to the effect of chronic neck pain with manipulative methods and cervical traction. There would be special research manipulative methods and axial traction with larger samples, with randomized groups, double-blind and controlled. In this way we would enable the stratification of patients treatment groups by weight of illness, sex and age. X-rays should be digitized, with standardization of anatomic positioning of the wrist. This will allow us to explore the effect on changing the structure of nodes and disease progression.

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