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Physiotherapy Treatment on Chronic Non Specific Low Back Pain

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1. Introduction

1.1 Physiotherapy in acute low back pain

While it is true that back pain is defined as pain or discomfort located in the bottom of the ribcage and the top edge of the buttock, based on the time course in which you are (acute, subacute or chronic), how to act on them, bound to have different approaches for a maximization of results.

With regard to the different methods of intervention it has to comment that much has been said for years about the effect of bed rest as a strategy for improving low back pain symptoms. However, it was found that is equal or less effective than a placebo treatment or no treatment and may become a risk for chronicity process from acute low back pain ¹⁻⁸.

By contrast, an active lifestyle, seems to favor the reduction of pain, time to return to work and disability rather than bed rest. It has also been shown to maintain this level of activity promotes a faster recovery, reducing the risk of relapse and more chronic pathology. However, when attempting to go beyond the trigger level, introducing therapeutic exercises as part of treatment, we observe that the results are equal to or worse than any other conservative treatment^{1,8-11}. Moreover, therapeutic exercise is not advised in many clinical practice guidelines from different countries as a means of intervention in the early stages of low back pain episode^{1,3,4,12-16}.

On the other hand, the use of analgesics in clinical practice guidelines from different states, we recommend the use of paracetamol and NSAIDs (in that order) ^{1,3,17-19} for the treatment of acute low back pain, suggesting the use of muscle relaxants in cases where the other two types of drugs have not been effective^{20,21}.

There is a slight controversy regarding the use of spinal manipulation as a mode of intervention in acute low back pain, as it is not entirely clear whether or not it is advisable to use in this state of pathology²². Faced with such an open debate, we understand that it would be necessary to analyze each case individually so far there is consensus in the way of intervention.

On the other hand, there are two very well-identified interventions that suggest they are used as a treatment to be performed in a second stage of acute low back pain (LBP sub-

acute) aimed at preventing chronicity more than the relief of symptoms of acute low back pain. These two modes of intervention are back school and multidisciplinary treatments^{1,2325}. Thus, in acute low back pain, it is observed at the base of treatment are three aspects that are crucial for clinical success:

- One is to provide the patient with adequate information, an overemphasis on the fact that back pain is not too serious problem, the evolution in most cases the evolution is directed toward a rapid recovery and return to daily life . In this part of treatment is recommended to make it easier for the patient increase awareness about your pain, trying to be supportive and helps to eliminate the negative stigma of this disease skeletal muscle. This will important that there is consistency in message among all clinicians who work with the patient.
- Provide adequate control of symptoms.
- Advise patient to try to keep an active lifestyle and return to normal life, including his working life as soon as possible.

1.1.1 Identifiers in acute chronic low back pain

As defined, low back pain was defined as pain or discomfort that is located between the bottom of the ribs and the top of the buttocks, with or without radiation to the lower limbs. As in other musculoskeletal disorders, there are three stages of low back pain attending to issues of temporality, acute, subacute and chronic.

There have been several studies whose aim was to identify those signs or variables that may help predict a patient's eventual evolution toward chronicity. To this end, the authors have been gradually moving away from the biomedical model to observe the patient from a broader perspective, the bio-psycho-social.

In literature, there is a lot of factors that may influence patients with acute LBP, however, have identified a number of them appear to be correlated with increased likelihood of more chronic musculoskeletal this pathology. These factors, mainly psychological and occupational, have proved more reliable as predictors of chronic low back pain. These indicators, identified by Melloh et al. (2008)²⁷ (Figure 1) should be taken into account by professional therapists and clinicians working with these patients and include them as areas that should be involved in the treatment plan.

- Characteristics or working conditions.
 - Impact on the role or on DLA.
 - Issues related to pain.
 - Medical considerations.
 - Depression.
 - Strategies of response to pain.
 - Fear of beliefs about the disease.
 - Social or emotional support.

Image 1. predictors of chronicity by Melloh.

1.2 Low back pain classifications

85% of low back pain who are diagnosed are performed without an objective test anatomical/radiological abnormality detected^{28,29}. People suffering from this disorder suffer musculoskeletal LBP.

Optimal treatment remains a great mystery, but there are some randomized trials suggest some improvement of which is scientifically proven. Nevertheless, it was found that people with LBP, have impaired motor control, which varies greatly depending on each person³⁰.

The approach is now more accepted in the scientific community is one that is based on the diagnosis for a classical determination, noting how the loss of motor control itself or as a result of secondary pathology.

This diagnostic process places great emphasis on the conclusion between the subject's history, radiology, pain behavior, physical examination findings as well as significant pathology (red flags) and psychological (yellow flags), including negative beliefs, stress anxiety, catastrophizing, depression^{31,32}, ...

One of the key that has changed the concept of LBP is to observe the musculoskeletal imbalance from a bio-psycho-social, which is currently accepted and widespread. So based on this approach, this motor response can be classified into three distinct groups³²:

- Group 1: subjects whose response is adapted motor control and is secondary to an underlying disease process.
- Group 2: subjects with secondary response is due to a psychological and / or social, not organic.
- Group 3: subjects that offer a maladaptive response following a load on the tissue that is abnormal and leads to ongoing pain and anguish.

On the other hand, Dankaers (2011)³¹ has identified some distinct patterns based on the direction where the motion is lost, where motor control is working properly motor control. This identifies the inflection patterns, active and passive extension, lateral tilt and multi-directional patterns. It has also been demonstrated as well-trained physiotherapists and doctors are able to differentiate the subjects and subclassified into these different groups.

1.3 Physiotherapy in chronic low back pain

Physiotherapy or physical therapy is a health science dedicated to study the life, health, illness and death of human beings from the standpoint of human body movement. It's characterized by search for the proper development of functions that produce the body's systems, where his performance good or bad, affects the human body or kinetic movement. It Intervene when human beings have lost or are at risk of losing or alter temporarily or permanently the proper motion and thus physical function by using scientifically proven techniques.

The World Health Organization (WHO) defines physical therapy in 1958 as "the science of treatment through: physical, therapeutic exercise, massage and electrotherapy. In addition, the Physiotherapy involves performing electrical tests and manuals to determine the value of involvement and muscle strength tests to determine functional abilities, range of joint movement and vital capacity measures and diagnostic aids for the control of evolution".

Given this reality, this discipline would possess all the credentials to treat low back pain from a conservative viewpoint successfully and safely. However, it is necessary to consider the spectrum of affection from low back pain that this disease does not always present a homogenous condition, but the severity of the condition may limit the person slightly, since this would suffer localized pain, or much more severe, preventing it to perform any work activity, with significant socioeconomic implications, particularly in developed countries. This musculoskeletal problem has an impact on many aspects of the person, such as quality of life, mobility, more likely to suffer long-term diseases, increased risk of social exclusion due to an inability to work, reduced income, isolation due to social disability.

Thus, low back pain is presented as a pathology that can be a considerable burden on the individual, their families, society and the economy (through loss of working days, or even the need to apply for retirement advance). Given this reality, the objectives of interventions and conservative treatments carried out through physical therapy, should be oriented towards reducing the symptoms of this dysfunction, such as pain management and disability, reducing anxiety states, trying to minimize the risk of recurrence and the time required for re-entry into the work.

This discipline has innumerable health tools that can be understood as a means of intervention in patients with chronic musculoskeletal disorders in general and low back pain in particular. This intervention strategies which a therapist can use are numerous: therapies, cognitive therapies that help pain management, complementary therapies, orthotics, physical therapy, electrotherapy, exercise, education, back school, some treatments invasive, such as acupuncture or postural ergonomics, for example.

While all of these alternative therapies are an option a priori for this clinician, not all these methods of intervention are equally effective. So this chapter will attempt to make a proposal for intervention based on scientific evidence demonstrating the effectiveness of each of the chosen methodologies, prompting the therapist to perform an exercise of reflection and selection techniques that may be more effective in their daily practice.

2. Patient assessment, diagnosis, prognosis and treatment: Clinical history

2.1 Introduction

An initial assessment can clarify the diagnosis of chronic low back pain or less. In the physical therapy a way that is nonspecific, ie not caused by a diagnosed disease, such as cancer, fracture, ankylosing spondylitis or other inflammation, though hardly reach the specific lumbalgias exceed six weeks of evolution, as is usually the early diagnosis of the cause of it.

2.2 History

For a complete patient assessment, it is important an adequate and exhaustive examination. The correct diagnosis depends on knowledge of functional anatomy, an accurate history of the patient, diligent observation and a complete examination. Accurate diagnosis is only established by a comprehensive assessment that includes the above factors. The purpose of the assessment must be to understand fully and clearly the patient's problems and the physical basis of the symptoms that cause them discomfort. All patients with chronic low

back pain should have a history and examination that should be performed in acute and subacute stages of the disease. However, a clinical examination should be performed also in the chronic phase, the first objective should focus on the location of calls red flags, to access the yellow flags and then make a specific diagnosis. However, it is well accepted that low back pain, sometimes it is not possible to reach a diagnosis based on the pathological changes detected, because too many diagnostic systems have been proposed in which back pain is categorized based on the distribution of pain, pain behaviour, clinical signs, disability, ecc³³.

The aspect that has to be prioritized is to ensure that the pain is musculoskeletal in origin. The next step is to exclude the presence of specific pathologies of the spine. While the first suspect should appear in the medical history, we can get confirmation of the diagnosis through a thorough analysis of the individual³³. The red flags such as neoplasms, infections, the syndrome of the cauda equina (cauda equina) are often difficult to find at this stage of the disease, however it is important to rule out a priori any of these options. The examiner should have sufficient knowledge to detect and diagnose major structural changes, deformities and serious spinal conditions. The patient should help the therapist to identify the type of pain and suffering the distribution. Clinical examination should provide confirmation that the patient complains of symptoms. If this were not the case, the type of pain should be classified as non-specific. It is also important to identify psychosocial yellow flags calls because they are factors that increase the risk of developing or perpetuating chronic pain, lengthening the time of disability suffered by the patient and, eventually, loss of working days the symptoms associated with produced by low back pain. Within these warning signs should be included inadequate skills in reference to back pain, (such as the patient to override a passive treatment by understanding that the assets will be lower), inappropriate behavior in terms of pain, being afraid to move and thus to progressively reduce the level of activity, work-related problems such as low job satisfaction or emotional problems may be clear examples of psychosocial yellow flags³⁴.

2.3 Physical examination

It is recommended that the diagnosis of triage in the first assessment and subsequent reassessments to exclude specific pathologies of the spine and nerve root. However, it seems advisable not spinal palpation and the use of motion tests in the diagnosis of low back pain. This recommendation is based on moderate evidence exists about the validity of the test of straight leg raising. This same level of evidence would say that there is no single test that has high sensitivity and specificity in the diagnosis of ankylosing spondylitis, a radiculopathy or spinal cancer. On the other hand, always based on moderate evidence, one could say that the pain provocation tests are more reliable than palpation tests. This has not been established as valid and reliable palpation tests, provided they are used for diagnosis, the presence of a manipulable lesion remains hypothetical^{35,36}.

2.4 Further exploration

Images are often used in patients with low back pain radicular pain assessment or identify any signs of serious alarm (red flag) and objective. The most common tests of diagnostic imaging in primary care centers usually plain radiography, bone scan, computed tomography (CT) and magnetic resonance imaging (MRI). In general, the reference to the

image must be based on a specific indication, although it is true that sometimes the patient arrives at the physical therapist once you have completed all the diagnostic tests, but it has the opportunity to participate in this regard³⁷⁻³⁹.

Of all diagnostic tests, radiography, its low cost and availability, is the most common, from a front, rear or side. This test allows us to precisely analyze the vertebral body height, alignment of the disc, and other morphological aspects of bone, however limited it to perform an analysis of the soft tissue structures. So despite the fact that other perspectives would be useful in the diagnosis of other rheumatic diseases, for diagnosis of low back pain, radiography would not be the best option, as it only allows an assessment of structural alterations⁴⁰.

For the evaluation of the warning signs of soft tissue, MRI is the best option for the precision it offers, in addition to be suffering a slow but steady expansion which makes it more and more evidence is available³⁹.

2.5 Physiotherapy diagnosis

A diagnosis is a common task for all healthcare professionals involved in treating patients, not just doctors, and in itself is not a medical act. The medical diagnosis is an important element but is not sufficient information to direct the physiotherapist. Physiotherapy diagnosis is an opinion based on rational critical analysis of all available information. It is imprescindible, therefore the incorporation of an evaluation, analysis and interpretation, own of the physiotherapist to guide him /her in planning therapeutic interventions, prevention and education and / or training the patient or user of their services. It is not, as the aforementioned decision, to "diagnose illnesses," it is an exclusive competence of the physician³⁶.

The physiotherapist has an important role in the functionality of the neuro - musculo - skeletal system and will need further evaluation within this framework. Thus, physiotherapy diagnosis should be formulated from the significant data on the patient's problems, as reflected in the common history. This history bio-psycho-social help each multidisciplinary team with the patient care. In addition and from a specific perspective, the diagnosis should be based also on an examination or assessment to assess the level of functional impairment of the patient as well as an explanation for the origin of such involvement.

Professional practice in physiotherapy involves processes and procedures among which the evaluation process, through which the therapist organizes its resources to learn and understand the patient's health condition from a motor and functional³⁶.

2.6 Prognosis

When speaking of prognosis in patients with low back pain, it is necessary to refer to those factors that help predict the evolution of the pathology and, therefore, those variables that help to predict future trends or events such as the return to work, the cost of the intervention, disability or the evolution of pain the patient suffers. Among these factors, the individual character and psychosocial professionals play an important role in the persistence of symptoms and disability. Thus, after analyzing several studies, one could

argue with strong evidence that workers who suffer acute back pain and work in places where they have to bend over constantly, have a higher risk of more chronic such alteration. Also, with the same degree of evidence, one could argue that people with low back pain for at least 4 weeks, have more trouble working back to normal and the lower the effectiveness of clinicians when the patient been absent during that period of his job.

It can be said, moreover, that there is moderate evidence that specific evidence of the physical examination are of great prognostic value in chronic low back pain. Thus, a prognosis of evolution of acute low back pain sub-acute to chronic, with moderate evidence, there are greater expectations of this happening when the patient psychosocial distress, depressive mood, severity of pain and functional impact and extreme symptom report, patient expectations, and previous episodes of back pain. And also maintaining the level of evidence could be considered predictors of chronicity the shorter length of labor, radicular or performing heavy work without modification³⁵.

2.7 Physiotherapy treatment

In a patient who suffers chronic back pain, a physiotherapist must do an exercise of reflection and try to plan your intervention based on two fundamental aspects: the symptomatological and functional. This could open a small internal debate about what should the clinician prioritize and possess both relative and absolute importance very important.

The wide range of therapeutic options held by the therapist, makes the customization of treatment as long as possible, should be a priority to tackling and improve musculoskeletal disorder that led to that person to the therapist.

As has been shown that chronic musculoskeletal involvement has a spectrum of influence that goes far beyond his own person, with repercussions on the family, society and employment. This problem should not go unnoticed by the physiotherapist and delegate, as far as possible in other health professionals if the situation closely, try to give a solution born of the subject and affect their environment but also to walk the opposite direction, the environment impact on the subject itself.

2.8 Ultrasound and low back pain

In recent years, the use of ultrasound (U.S.) has been progressively extended, due to its economy, reliability, relative ease of use and accessibility. Specifically in the back, although it has shown the importance of the deep back muscles by neurophysiological and biomechanical. Ultrasound is gradually taking a greater presence and are identifying themselves as a very useful tool for the assessment and treatment of patients with low back pain⁴¹⁻⁴⁷.

This instrument has been used for quantitative assessments using static and dynamic images to understand the morphology and behavior during muscle contraction on both paraspinal and abdominal belt muscles. They have observed changes in muscle architecture based on the intensity and duration of the contraction, allowing use by a researcher to analyze the behavior of muscle as well as instruments of feedback to the patient^{49,50}.

While there has been the usefulness of this instrument, it is important to consider the location, the positioning of the operator with respect to the patient to make a record and therefore a correct interpretation of the image⁵¹.

Studies on a static muscle is important for different important aspects of it, such as differences in the edges of the muscle, so that it can be studied by analyzing the relationship between cross-sectional area, and other aspects like morphology, subject's BMI, pennation angle, shape, thickness ... These same records can be made in the same way during both isometric and isotonic contraction, being able to see how it changes as the muscle changes the intensity of contraction, the time of the same or the angle of the two bones in which it is inserted⁴⁹⁻⁵².

Ultrasound has proven to be a tool with reliability comparable to that of nuclear magnetic resonance, however, the latter does not have the ability to analyze the muscle during an isokinetic contraction. Reference has been used as electromyography, showing a curvilinear relationship on parameters that can be obtained with ultrasound, as the muscle thickness or pennation angle, so that it could be possible suggest the use of ultrasound, in both the clinical and research⁵¹.

3. Evidence based physiotherapy: What are most effective interventions?

3.1 Introduction

The evidence-based physiotherapy (EBP) is a current focus on teaching and health practice, which emphasizes the importance of examining the evidence from research, careful interpretation of clinical information derived from unsystematic observations, and where understanding of the pathophysiology of disease is insufficient for quality clinical practice^{53,54}. "The practice of evidence-based physical therapy should be informed primarily by the research of high quality, patient preferences and knowledge of physical therapists"⁵⁵.

Under the current definition of the FBE there are some additional factors that interact with the quality research, knowledge and practice of patient preferences, these factors are culture, politics, resources, ecc. So they are who will determine the specific context on which the decision applies.

The FBE clinical practice is an attempt to respond to this new situation, mainly through three strategies: learning methodology, the pursuit and implementation of abstracts and scientific information gathered by others and the acceptance of protocols and guidelines developed tested by third parties. The exercise of the FBE would not be such without the consideration of each situation and each scenario. On the other hand, the roles in the relationship between professionals and patients are variable, and there is a clear demand for direct participation of patients in decision making⁵⁵.

The FBE can be applied in daily work with any type of physiotherapy intervention, whether diagnostic, therapeutic or preventive and may be a useful tool for assessing the results of these interventions (Herbert, 2000), because it helps optimize the time of professional application criteria can accumulate in different scenarios and / or patients, improving accessibility to information and helps to reduce uncertainty. Also, when our expertise and daily practice does not follow the recommendations of the literature, the decision finally will be more likely to adopt proven and reasoned. The suggestions will be stronger if one is aware of the extent and strength of recommendations regarding an intervention.

3.2 Evidence-Based Physiotherapy (EBP)

Different scales have been used when classifying the different types of studies consulted. Thus, those involving an intervention, we used the proposed assessment by PEDro, which classifies studies according to internal validity on a scale of 0 to 10, which uses the following evaluation points, which add a point to the validity of the study for each one that is confirmed. The trials achieved a score equal to or greater than 5 were considered high quality⁵⁷. The criteria used were:

1. Subjects Were Allocated randomly to groups (in a crossover study, subjects randomly Were Allocated an Treatments Which Were in order received)
2. Allocation concealed WAS
3. Were the groups similar at baseline regarding the Most Important Prognostic Indicators
4. There Was blinding of all subjects
5. There Was blinding of all therapists Who Administered the therapy.
6. There Was blinding of all Assessors Who Measured at least one key outcome.
7. Measures of outcome at least one key Were Obtained from More Than 85% of the subjects initially allocated to groups.
8. All subjects for Whom Were available Outcome Measures The Treatment Received or Allocated as condition or control, where, This Was not the case, data for at least one key outcome WAS analyze by "intention to treat"
9. The results of between-group Statistical Comparisons are at least one report for key outcome
10. The study Provides Both point Measure and Measures of variability for at least one key outcome

Thus, the quality of the methodology used in a systematic review (SR) was evaluated by Oxman and Guyatt index. On a scale of 0 to 7, those who scored higher than 5 were considered high quality, while its value was less than the index, were classified as low quality.

Thus, it is classified according to levels of evidence based on evidence levels for the treatments are classified according to the following classification⁵⁸:

- Level A (strong): the results are drawn from a high quality systematic review consists of multiple randomized controlled trials (RCT) of high quality.
- Level B (moderate evidence): results of a systematic review consists of randomized controlled trials (RCT) of low quality.
- Level C (limited or conflicting evidence): derived from a clinical trial (high or low quality) or a systematic review of several RCT inconsistent results.
- Level D (without evidence): No RCTs were identified.

Thus, taking as base the strength of evidence consulted, there have been a series of statements in which roughly suggests the use of a particular methodology or intervention technique.

3.3 Clinical evidence of physical agents in physiotherapy

- **Interferential Therapy.** Defined as the surface application of medium frequency alternating current to cause low frequencies to 150 Hz There is no evidence on the

effectiveness of using this therapy compared with placebo treatment in low back pain, although there is limited evidence about the similarity of effects caused by lumbar traction, massage and interferential therapy in chronic low back pain^{59,60}.

- Laser therapy: surface application of laser wavelength of 632-904 nm. Optimal treatment parameters (wavelength, dose, dose intensity) are uncertain. When analyzing the effect of this therapy as a means of reducing low back pain there is conflicting evidence about it^{61,62}.
- Lumbar support, brace or corset used to give passive support to the back. This type of instrument lacks scientific evidence when compared with placebo treatment or other treatments for low back pain intervention^{63,64}.
- Shortwave diathermy: Therapeutic elevation of the temperature of deep tissues by application of short wave electromagnetic radiation with a frequency range between 10 and 100 MHz. This intervention methodology lacks scientific evidence when compared with a placebo or other treatment as a means of intervention in low back pain⁶⁵.
- Therapeutic ultrasound: Therapeutic application of high frequency sound waves up to 3 MHz. Evidence that this technique is limited in treating back pain when compared to placebo and no treatment when considering other methods of intervention⁶⁶.
- Thermotherapy: superficial heat in the lower back. There is a lack of scientific evidence of this methodology when compared to placebo treatment or other treatment as an instrument of intervention on chronic low back pain^{66,67}.
- Traction: pulling intervention that aims to stretch the lumbar spine. ExSite a variety of methods can be used with this technique, but usually involve the use of a harness around the lower rib cage and revolves around the iliac crest, using free weights and pulleys, a motorized mechanism, inverse techniques or headband to cause traction. As evidence of this methodology of intervention, it is limited to say that lumbar traction is not more effective than sham traction and zero when compared with other methods of intervention in low back pain^{67,68}.
- Transcutaneous electrical nerve stimulation (TENS) using surface electrodes, using electrical impulses seeking to relieve symptoms by changing the perception of pain. The evidence that this methodology is no better than placebo treatment of low back pain is strong, being moderate when compared to the electro-axial decompression, or acupuncture^{66,69-72}.

3.4 Clinical evidence of manual therapy in physiotherapy

- Manipulation / mobilization, manual therapy techniques used in the short or long levers to move back. This move pushes the spinal joint beyond its range of motion, by a pulse of high velocity low amplitude. Those made with large amplitude, low velocity and passive movements often remain within the joint range.

With moderate evidence, one might argue that the mobilization of the spine gets better results in the treatment of low back pain a simulated mobilization, but get the same effect as standard medical practice through the use of analgesics.

The level of evidence becomes moderate when mobilization and standard medical practice are combined and is more effective than medical treatment in isolation. Evidence is also moderate when viewed equal effects produced by therapeutic exercise and manipulation in low back pain^{73,74}.

- **Massage:** Soft tissue manipulation with the hands or a mechanical device through a variety of specific methods. As evidence, it seems that there is limited evidence when talking about the fact that massage causes on subjects suffering chronic back pain by saying that there is no difference between this technique and the use of a corset, that massage is more effective in symptomatological treatment of low back pain when compared to acupuncture, physical therapy, self-management education, the placebo treatment, postural education, relaxation therapy. There are also limited evidence that massage is as effective as manipulation in low back pain but, however, functional improvement is greater in spinal manipulation⁷⁵⁻⁷⁸.

3.5 Clinical evidence of therapeutic exercise in physiotherapy

As for the therapeutic exercise, there is moderate evidence that short-term improvements achieved over the reduction of pain and disability than passive treatments. There is strong evidence that treatment with therapeutic exercise is more effective than standard medical practice for both the reduction of pain, disability and the average time to return to work. This level of evidence is maintained when you try to say that strength training - conditioning, there are more effective than other exercises in the treatment of chronic low back pain^{73, 79-83}.

4. Manual therapy as an intervention on chronic low back pain

4.1 Massage

Massage is the technique used for longer physical therapists in history. Instinctive mode makes use has been used by almost every culture in history, like the Greeks and Romans (where, among other uses, was used to retrieve the athletes and gladiators, respectively, after the shows), the ancient Egypt, where priests were using it in conjunction with other therapeutic techniques and even in China, where emperors of the best massage therapists available to treat their musculoskeletal complaints.

Although massage is socially understood as a technique of intervention whose focus is the muscle, it must have a broader definition because it is the set of soft tissues the main beneficiaries of this technique, for which the therapist can use both hands like some kind of mechanical device. In clinical practice, massage is often applied in combination with other therapies such as exercise and other interventions, but also sometimes as a single treatment.

A common way of using this technique is to combine the rules of physical medicine massage and neural therapy through acupuncture, where, without the insertion of the needle, but by using a specific instrument (vibrating) is achieved stimulation of acupuncture point superficial. Moreover, within the classical techniques of massage effleurage should be discarded, friction, kneading or petrissage. If we make an analysis of the evidence of this technique as a routine therapeutic practice can see how there is limited evidence that massage gets the same effects as spinal manipulation and the use of the corset. More effective than spinal manipulation, exercise therapy and postural education, relaxation therapy, physical therapy and acupuncture are less effective than the use of therapeutic physical exercise combined with health education when discussing the effect upon the symptoms of people suffering from chronic LBP.

4.2 Spinal manipulation / mobilization

It is important to distinguish between what is manipulation and mobilization. Manipulation of the column is defined as an impulse of high velocity low amplitude that exceeds the limited range of motion but always runs within the anatomical limits of the joint. However, mobilization is understood as a low speed drive range of movement and manipulation, although in both cases remains the rule of not exceeding the anatomical limit of the joint.

Although the distinction between both methodologies, most studies that have been consulted didn't made a clear distinction between each technique, but usually defined as "spinal manipulation package."

While these manual techniques are widely used as a tool in daily clinical practice, there are no randomized trials that allow too many draw firm conclusions about the effect that spinal manipulation leads.

While these manual techniques are widely used as a tool in daily clinical practice, there are no randomized trials that allow too many draw firm conclusions about the effect that spinal manipulation leads. Still, in recent years some trials have been developed that have allowed the increased strength of the conclusions, as they have increased the intrinsic quality of it and thereby allowing some light to the effect that these techniques lead to people with chronic LBP.

As for the evidence can be provided on the effect of manual therapy can bring to their use in the treatment of LBP symptomatological chronic, there are two limits that must be considered when interpreting the same. The first is that all interventions that have been observed allowing an evolution of the effects of manipulaición / mobilization in the short term, however, be important to determine how this technique can provide after long term intervention protocols, especially in this type of patients. On the other hand, there is also a problem regarding the unification of criteria in the different streams of existing manual therapy (manual medicine, osteopathy, physiotherapy, chiropractic ...) when defining a person qualified to perform such maneuvers. Based on these two aspects and based on the studies consulted, one could argue based on moderate evidence that manipulation / mobilization achieves better effects on symptoms of back pain than placebo treatment. Similarly, manipulation / mobilization used as a complement to standard medical treatment manage to increase the effect of this short term. On the other hand, it has found the same effects in the treatment of chronic low back pain when a therapist uses spinal manipulation when using a therapeutic exercise program, a program of back school or when compared with standard medical practice, although in the latter case, the evidence is strong rather than moderate ^{35,36,84,85}.

Thus it's possible to see how the manipulation / mobilization vertebral have an effect simimar that could be seen in other health interventions in the treatment of chronic low back pain symptomatological. However, one of the aspects which would need to answer is to identify, within the range of possibilities that have qualified physical therapist to intervene, using manipulation / mobilization, subjects suffering from chronic back pain, what exercises are most effective in treatment of this disease, since there is no criterion when identifying them, the term is too imprecise.

5. Active treatment in chronic low back pain: Exercise therapy

5.1 introduction

Chronic low back pain, as defined previously, back pain is defined as pain and discomfort, located between the costal margin and the inferior gluteal folds, with or without referred pain from the leg. Chronic back pain defined as pain in this location for at least 12 weeks. This means we try to chronic sub-acute pain maintained for periods longer than 12 weeks or the appellants, where the current episode lasts at least this time.

Therapeutic physical exercise (TFE), can be defined as any program in which, during the sessions participants are required to perform static or dynamic movements and where the exercises were intended as a treatment for chronic low back pain, with supervised exercise and / or prescribed.

Being a chronic musculoskeletal disorder, therapeutic exercise, seems to be a good treatment option, however, some doubt is normal in this type of assault interventions such as exercise intensity, number of sessions per week, if you get the same effects regardless of the environment where the intervention takes place or whether the intervention should be group or individual. In any of these questions we will try to answer in this section.

5.2 Exercise intensity and cumulative exercise: Number of weekly sessions

So far has always been measuring the use of physical activity account for these two variables independently, however, for several years, a new concept is gaining prominence when speaking of exercise weekly. This idea comes from the fusion of both and has an own unit of measurement, METs (metabolics equivalents). One MET is equivalent to the expenditure of an individual who sits for a minute. Thus, an adult walks One MET Represents an individual's energy while sitting quietly Expenditure per minute. An adult walking at 4.82 km / h in flat terrain and hard consumes about 3.3 METs, whereas if the speed go up to 8.05, also spending would amount to 8 METs or so. As the end of a week, accumulating energy expenditure a person will be the summation of everything he has accomplished during that time period, being able to make an estimate of cumulative effort by the patient⁸⁶.

The concept of dose is often used to describe physical activity, but can be interpreted in many ways (cumulative, intensity, frequency, duration, physical activity ...). This idea gradually being introduced into clinical practice of a physical therapist to intervene on patients with chronic musculoskeletal disorders such as back pain, yet there is not much literature that has used this form of measurement in the low back pain. However, if there are some published studies comparing the optimal frequency of intervention on these patients through exercise. Thus there is strong evidence that all those interventions that make a subject and at the end of the week it has accumulated a minimum of two hours of treatment and a maximum of two hours and forty-five minutes of treatment on this type of pathology⁸⁶⁻⁸⁸.

5.3 Individual or group exercise?

The physical factor is a priori, the most influential within the therapeutic effects of EFT as, individually planned and ensuring consistency in the precocity, the training effect will

achieve the objectives previously established. Therefore, the key lies in the design of achievable objectives for each condition and adapted to the evolutionary process.

Thus, based on the objective pursued by each patient, we can differentiate between: planning treatment for recovery training, when we try to restore or improve impaired function, and therapeutic planning training for compensation, when we try to compensate or improve global function, because the current problem is not improved.

On the other hand, and understanding that an EFT program conducted as a means of intervention on chronic low back pain means that the duration of such treatment is usually not less than two months, so that, taking into account the cost of a physiotherapist for each hour of work, would be difficult for all patients who suffer from chronic back pain, could make an intervention where the therapist-patient ratio was 1:1. Thus, a way to save the expense would increase this ratio to reach heights that range between 1:8 and 1:12.

For its part, the therapist could make an identification of the active treatment of the person based on this initial assessment. Thus, tracking group, but a search of the objectives individually get very interesting balance between the cost of services received by the patient and increasing symptomatic improvement by the patient^{89,90}.

5.4 Environment where the exercise should be performed: Is the water always a good option?

More and more frequent the facilities they offer services that can be performed physiotherapy intervention for chronic musculoskeletal disorders in the aquatic environment, partially or completely carried out within it. Conducting the activity in the water, has a number of advantages such as decompression of the lumbar spine validated with accurate measurements of body height, changes in all functional parameters of mobility, strength and endurance as well as improved cardio-metabolic disorders negatively and significantly correlated with the degree of pain and disability and provide for adequate monitoring and follow-up after individual assessment through indicators with heart rate and subjective scales of effort. However, it also presents some limitations, especially in deep pools, such as feelings of insecurity in those who are not fluent in the aquatic environment.

It found, however, studies show that exercise performed in water treatment is more effective than EFT made out of it or vice versa, so it will be a patient choice and / or choosing a therapist use a certain methodology or another.

However, if you have found in clinical trials has been shown that the same treatment carried out of water but with water running supplementation produces better results in symptomatic improvement in patients with chronic LBP^{91,93}.

In conclusion of this section and articles based on the respondents, one could say with strong evidence that strengthening exercises are more effective than other types of exercises. Likewise, and maintaining this level of evidence has shown that exercise is more effective than general medical practice to reduce pain, disability, and return to work in the medium term (3-6 months), but not is more effective than conventional physical therapy intervention.

The level of evidence when it comes down to that moderate exercise is more effective than passive treatment in reducing pain and / or disability^{1,3,35,73}. On the other hand, and already

with a limited level of evidence has been found that intensive multidisciplinary programs face can not be said which of these is most effective. Furthermore, while maintaining that level of evidence, differences were no differences between aerobic and strength exercises, in terms of pain and the degree of long-term disability, no differences between the effects on the reduction pain, to perform the exercise in just 4 sessions, compared to 8 sessions, aerobic exercises are superior to lumbar flexion, in terms of pain immediately after the program and a program for individualized home exercise is more effective than general exercises.

6. General supplement to chronic low back pain treatment: Brief advice and health education

6.1 What is the brief advice

When talking about brief advice, it is difficult to define this definition in terms of content, time and form.

From a temporal point of view, there are two types of interventions that target different. One aims to ease concerns, worries and doubts that early intervention would address the initial short questions and fears that the patient suffers. On the other hand, there are some interventions that are longer and requiring more profound impact on aspects of the problem by helping the integration of the pathology of the patient.

While there are different ways to provide brief advice to the patient (in person, by telephone, with a booklet written, using internet ...), has not been able to show which method is most effective when the patient integrate such training, although they can identify some problems that can affect certain methodologies, such as internet use, as in older people, who are not familiar with the use of this medium can be an insurmountable limit.

We are talking about a process in which a person gives to another or other information about a specific problem, chronic low back pain. Here's beliefs, the communication skills by the physiotherapist, the material available are some aspects that could influence the determinants of credibility and effectiveness of the intervention.

On the other hand, it would be important to consider those who have a paid position and it is absent due to any pressure that they may suffer by changing their employment status is experiencing, it would be important to monitor absenteeism labor is causing low back pain in the patient.

So it appears that brief advice delivered by a physiotherapist or clinical staff is a promising tool that can help save significant time and resources which can benefit both the patient and the clinician. This statement could be shot by studies that demonstrate strong evidence that brief advice is as effective as aerobic exercise routine or physical therapy in reducing disability, shortening time to return to work or patient's daily activities. Furthermore, with moderate evidence, we can say that brief advice is more effective than usual care in reducing the time of return to employment and the promotion of self-care helps reduce the typical symptoms of lumbar pain as pain or disability. However, there is limited evidence that the transmission of information through internet use is more effective than no intervention in reducing pain or disability of a person who suffers chronic back pain⁹⁴⁻⁹⁸.

6.2 Cognitive behavioral methods of treatment

It is important to consider that treatment of low back pain is not solely focused on eliminating chronic underlying pathology, but the reduction in symptoms and disability that it causes by changing the contingencies that the environment of the patient may have and through cognitive processes. Of these, the cognitive processes can be divided into three different styles of intervention depending on the therapeutic approach is desired to give. This may be operant, cognitive and respondent. Each of them focuses on the modification of one of the three response systems that characterize emotional experiences that are the behavior, cognitions and physiological reactivity.

The first is based on the principles of operant conditioning of Skinner (1953)⁹⁹, where healthy behaviors are reinforced positively and to all those aspects that relate to negative symptoms like pain, is stripped of patient care. The assistance of the people around them as partner, family, friends, have an important role in this process.

Cognitive therapy for its part has as its objective the identification and modification of the cognitive aspects of patients on pain and disability. This change in the definition of pain or expectations of control over it is achieved with cognitive restructuring techniques (directly) or by changing beliefs, feelings and thoughts¹⁰⁰.

Finally, the defendant treatment which aims to achieve is a change in the direct physiological response, such as by muscle relaxation, for which the patient seeks to provide a model of relationship between stress and pain, teaching himself to use the relaxation in response to accumulated muscle tension. To achieve this, it uses material that may help the patient understand what is happening, such as biofeedback or EMG.

As you can see, these methods seek to cognitive and behavioral changes in both behavior and cognition on the basis of treatment being offered. The main approach used by these techniques is that both pain and disability that this condition creates are the result of psychological and social factors, not just because of a somatic pathology.

Although they appear several objectives and methodologies used by cognitive and behavioral therapies, these two techniques have several things in common:

- The behavior and emotions of individuals are influenced by your thoughts.
- The patient is able to acquire skills to solve various problems.
- To get a change maladaptive thoughts, feelings and behaviors, you can make use of structured techniques to help identify, control and change these conditions.

Different studies have demonstrated the effectiveness of behavioral treatment in chronic low back pain. Thus, one could argue with strong evidence that this intervention is more effective than no treatment or placebo. On the other hand, always with the same level of evidence, we can say that there are no differences in results obtained with the three streams of treatment. In addition, the behavioral approach is demonstrated more effective than traditional treatments in facilitating the return to work by patients.

The evidence comes down to moderation for that treatment to cognitive-behavioral treatment has joined other effects of long and medium term chronic low back pain. In addition, there is limited evidence that intervention on pain, disability, functional status, depression or therapeutic exercise and behavioral therapy are equally effective¹⁰⁰⁻¹⁰⁴.

7. Multimodal treatment in chronic low back pain

7.1 Introduction

The current concept of man does that is defined beyond its own anatomic barrier. Your life will be determined by biological, psychological and social. The response and adaptation to each individual contribution they will determine your state of health. Thus, the therapeutic approach should contain different proportions depending on the case, a portion of each of these perspectives.

The content of multidisciplinary treatment programs usually consists of a broad mix of the physical, social and behavioral modification and drug use. Usually, these programs are held for a considerable number of hours a week, sometimes even on an inpatient basis. The content of these programs and how they are labeled or described is very variable. For example, multidisciplinary biopsychosocial rehabilitation, rehabilitation programs, behavioral programs, back schools, or functional restoration programs (FR) may involve one or more of these components. True multidisciplinary treatment program that includes medical (drug treatment, education), physical (exercise), vocational and behavioral components must always be at least three health professionals with clinical backgrounds (doctor, physiotherapist, psychologist), although the intensity and content of interdisciplinary therapy varies widely.

Based on the evidence we have seen in the preceding paragraphs, it appears that the most effective combination, a priori, would be to combine therapeutic exercise, manual therapy and health education and behavioral programs. Each one of which could be developed as follows:

- Individual therapeutic exercise program fully supervised, organized and run as a group (8 patients per therapist). With an initial assessment for planning of therapeutic exercise, looking at the bio-pathomechanics functional assessment as a starting point to set the exercise individually, including assessment of mobility (goniometry), strength and muscular endurance (dynamometry) and motor control system of local spine stabilization.
- Brief interventions for spinal manipulation and mobilization for the normalization of hypomobile identified areas through integrated manual therapy, exercise program.
- Health education integrated into the exercise program and behavioral strategies of adherence, as well as brief educational interventions, which may be provided by a physiotherapist to encourage a return to normal activities.

7.2 Combined or add effects

A priori one might tend to think that this question does not make much sense, because a multimodal program should be based on evidence offering a combination of those therapies that are most effective, ensuring a summation of effects, however, failed to show that as a result of a multimodal treatment intervention to obtain the sum of the effects of each of the interventions separately. It is very likely not the case because there may be variables that are improved with an intervention or another. It is also important to remember that physiotherapy intervention is aimed at symptomatic improvement of this alteration of the musculoskeletal system, and the patient support in assessing the patient's results will play an important role.

7.3 Multimodal treatment: When you do when not

From a health policy, to where it shifts the balance of costs and benefits, as these multimodal intervention programs can make a way out of health care resources. However, always committed and difficult to assign economic value to the quality of life, function, disability and / or pain, so to complete the analysis of cost-benefit can be tricky. On the other hand, would be included in this analysis are trials that can determine whether the effects on employment status, in terms of availability or fitness for patients who suffer from chronic back pain, in addition to a comparison of the response mode with the subjects on the basis of gender or age.

Although, as noted above, is necessary to deepen the results that can provide treatment multidisciplinary subjects suffering chronic back pain be stipulated that some evidence (strong and moderate) have been obtained in this regard. Thus, strong evidence, one could argue that a treatment that combines intense physical training and behavioral therapies integrated within the same treatment protocol, is able to reduce absenteeism in workers who suffer from chronic back pain. Likewise, one could say with strong evidence that those subjects who suffer chronic back pain have reduced pain and disability, improving the function by a multidisciplinary program of physiotherapy intervention¹⁰⁵⁻¹¹².

On the other hand, there is moderate evidence that intensive rehabilitative multidisciplinary program is more effective in reducing pain than non-multidisciplinary outpatient therapy or even the usual treatment.

8. How to increase the effect of chronic low back pain treatment? Intervention in subgroups

8.1 Introduction

When asked how to increase the effect of treatment in low back pain can be considered two types of responses. The first comes from an actual increase of the effect that treatment can bring to a particular type of patients, which would require the division of patients with low back pain whose treatment in specific subgroups specifically consideration of its characteristics making a proposed intervention much tighter to the subject in particular and the general group.

On the other side and to a very heterogeneous reality to which therapists have to face the world, another perspective that could provide a valid answer to this question would be to seek maximum efficiency of resources available to the professional clinician, not only referring to the material, but also time and space available.

8.2 Different groups of variables divided to chronic low back pain

If we consider each individual perspective, it could provide two different types of responses. The first was pursuing a net improvement of treatment effect, which would be necessary to clarify factors that define the person, such as age, sex, body mass index, and so on. chasing in a group intervention, a personalized treatment as closely as possible. Thus, the main factor in making the subgroups born of the characteristics of each subject.

In turn, as has been observed in recent years have seen an expansion of treatment in chronic diseases músculoesqueléticas. Of these, the most common of all is the low back, creating groups and specific methods of treatment for this condition. Regardless of whether the agency offers these services is public or private, both seeking to increase efficiency and, therefore, a better balance between cost - effectiveness. This view could prompt more commercial thinking about seeking treatment depersonalization of economic performance just the same, however, studies which demonstrate the optimal frequency of low back pain intervention can help better use of space resources and temporary available, and may favor the increased supply and therefore the number of patients treated and satisfied with the service received.

8.3 Evidence of increased effect: Studies published

In recent years there have been several published studies that attempted to answer this question considering different variables as a criterion for differentiating lumbálgicos groups receiving treatment. The main subdivisions were made based on body mass index, based on the environment where treatment was performed at the age of people who perform it.

He has watched a speech delivered in groups where the criteria of subdivision was the body mass index¹¹³, evolved similar patients in different intervention groups, it seems that this variable does not affect to the evolution of the patient may suffer in terms of symptomatic improvement of low back pain. These results are contradictory to a study that is under review, according to which, people who are obese are not only more likely to suffer back pain, but the treatment effect is inversely proportional to the rate of mass body present.

On the other hand, it has been shown how optimizing available resources are two key aspects to be considered, the number of sessions per week and the medium in which the intervention. This has been shown how a person performing two sessions of physical therapy to improve symptoms of low back pain evolves faster than those who performed only one session per week^{87,114}. However, among those who engaged in twice-weekly and three symptomatic evolution could be comparable. This could be in line with the show already in 2007 brought the American College of Sports Medicine from the recommendations of which does not speak of sessions a week, but a cumulative total exercise per week based on the intensity. In paragraph 5 is much deeper in this argument.

Another aspect that has been taken into account when classifying interventions is one in which the environment is considered where the intervention. It has been observed how the subject performs a physical therapy intervention completely dry or a part of the exercise in the water, get a similar evolution in both media. This allows it to be the patient who chooses what kind of environment you prefer when making your own protocol for intervention. However, it has watched a physiotherapy intervention which will supplement water running protocol, the patient experiences an increase in symptom improvement when performing this protocol with respect to when it does.

TREATMENT		ACUTE LBP	SUB-ACUTE LBP	CHRONIC LBP
PHYSICAL THERAPY	Interferential therapy	X	X	X
	Laser therapy	X	X	X
	Lumbar supports	X	X	X
	Shortwave diathermy	X	X	X
	Therapeutic ultrasound	X	X	X
	Thermotherapy	X	X	X
	Traction	X	X	X
	Transcutaneous electrical nerve stimulation (TENS)	X	X	X
	Exercise therapy	X	√	√
	Bed rest	X	√	√
	Active lifestyle	√	√	√
Manual therapy	Manipulation/mobilisation	√	√	√
	Massage	X	X	X
	Back schools	X	√	√
	Minimal contact/brief educational interventions to promote self-care	√	√	√
	Cognitive-behavioural treatment methods	√	√	√
	Multidisciplinary treatment	X	√	√
	Antidepressants	√	√	√
	Muscle relaxants	√	√	√
	NSAIDs	√	√	√
	Capsaicin	√	√	√
	Paracetamol	√	√	√
	Epidural steroids	X	X	X
	Percutaneous electrical nerve stimulation (PENS)		√	√
	Acupuncture	X	X	X
	Neuroreflexotherapy		√	√

Table 1. Appropriateness of treatment based on pathology

Chronic NLBP		Acute NLBP	
Brief. Ed. Interv. Prom. SelfC. = Aerobic Exerc. TENS=Placebo Brief educational interventions to promote self-care. = Usual physiotherapy. Therapeutic Exercise = Gnarl Physiotherapy. TE = Other Exercise TE > General Practice MT = GP		Paracetamol < mefenemic acid Paracetamol = NSAIDs NSAIDs > Placebo NSAIDs = Muscle relaxants NSAIDs = opioid analgesics NSAIDS > non-drug treatments Muscle relaxants > Placebo Spinal Mobilization > Placebo Spinal Mobilization = Therapeutic Exercise Spinal Mobilization = Analgesic	
Brief. Ed. Interv. Prom. SelfC. = GP. Back School = Exercise Back School = Manual Therapy. Back School = Brief. Ed. Interv. Prom. SelfC MT > Placebo MT MT = Usual physiotherapy. MT = Back School TE > Passive Interventions MT + GP > GP		Paracetamol = Aspirin Bed rest < Placebo Remain Active > Bed Rest TE > Placebo TE > Bed Rest TE > Brief. Ed. Interv. Prom. SelfC Flexion Exercise > Extension Exercise Paracetamol= indomethacin Spinal Manipulation > Massage TE > Massage Multidisciplinary Treatment > GP Behavioral Treatment > GP	
Laser therapy ≠ Placebo Ultrasound ≠ Placebo Massage > Placebo Massage > Acupuncture Massage > Relax therapy Massage = MT TE ≠ Multidisciplinary program Aerobic Exercise > Flexion exercise Diathermia = Placebo Individual Exercise. > Generic exercise Aerobic Exercise = Strength Exercise 2 = 4 Weekly sessions		Back School = Physical Therapy Back School < General Exercise Brief. Ed. Interv. Prom. SelfC > GP Back School = McKenzie exercises	
Interferential = Placebo			
LEVEL A	LEVEL B	LEVEL C	LEVEL D

Table 2. Low back pain evidence after revision

9. References

- [1] Bigos S, Bowyer O, Braen G et al. Acute low back problems in adults. Clinical practice guideline no. 14. AHCPR publication no. 95-0642. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of health and Human Services. December 1994. [USA]
- [2] Van Tulder MW, Furlan A, Bouter LM, Bombardier C and the Editorial Board of the Cochrane Back Review Group. Updated Method Guidelines for Systematic Reviews in the Cochrane Collaboration Back Review Group. *Spine* 2003; 28: 1290-9.
- [3] Royal College of General Practitioners. Clinical Guidelines for the Management of Acute Low Back Pain. London, Royal College of General Practitioners, 1996 and 1999. [UK].
- [4] Evans G, Richards S. Low back pain: an evaluation of therapeutic interventions. Bristol: Health Care Evaluation Unit, University of Bristol, 1996.
- [5] Hagen KB, Hilde G, Jamtvedt G, Winnem M. Bed rest for acute low back pain and sciatica (Cochrane Review) In: The Cochrane Library, Issue 4, 2000. Oxford: Update Software.
- [6] Koes BW, van den Hoogen HMM. Efficacy of bed rest and orthoses of low back pain. A review of randomized clinical trials. *Eur J Phys Med Rehabil* 1994; 4: 86-93.
- [7] Van Tulder MW, Koes BW, Bouter LM. Conservative treatment of acute and chronic nonspecific low back pain: a systematic review of randomized controlled trials of the most common interventions. *Spine* 1997; 22: 2128-56.
- [8] Waddell G, Feder G, Lewis M. Systematic reviews of bed rest and advice to stay active for acute low back pain. *Br J Gen Pract* 1997; 47: 647-52.
- [9] Hilde G, Hagen KB, Jamtvedt G, Winnem M. Advice to stay active as a single treatment for low back pain and sciatica (Cochrane Review). In: The Cochrane Library, Issue 1, 2004. Chichester, UK: John Wiley & Sons, Ltd.
- [10] Hagen EM, Eriksen HR, Ursin H. Does early intervention with a light mobilization program reduce long-term sick leave for low back pain? *Spine* 2000; 25: 1973-6.
- [11] Rozenberg S, Delval C, Rezvani Y, et al. Bed rest or normal activity for patients with acute low back pain: a randomized controlled trial. *Spine* 2002; 27: 1487-93.
- [12] Malmivaara A, Kotilainen E, Laasonen E, Poussa M, Rasmussen M. Clinical Practice Guidelines: diseases of the low back. (Finnish, available in English) The Finnish Medical Association Duodecim 1999. [Finland]
- [13] Faas A, Chavannes AW, Koes BW, Van den Hoogen JMM, Mens JMA, Smeele IJM, Romeijnders ACM, Van der Laan JR. Clinical practice guidelines for low back pain. (Dutch, available in English). *Huisarts Wet* 1996;39:18-31. [the Netherlands]
- [14] Bekkering GE, van Tulder MW, Hendriks HJM, Oostendorp RAB, Koes BW, Ostelo RWJG, Thomassen J. Dutch physiotherapy guideline for low back pain. (KNGF richtlijn lage rugpijn) *Ned Tijdschr Fysiother* 2001;111 (Suppl. 3): 1-24. [the Netherlands]
- [15] Nasjonalt ryggnettverk - Formidlingsenheter. Akutte korsryggsmerter. Tverrfaglige, kliniske retningslinjer. Oslo, 2002: Nasjonalt ryggnettverk. [Norway]

- [16] Van Tulder MW, Malmivaara A, Esmail R, Koes BW. Exercise therapy for nonspecific low back pain (Cochrane Review). In: The Cochrane Library, Issue 4, 2000. Oxford: Update Software.
- [17] Van Tulder MW, Scholten RJPM, Koes BW, Deyo RA. Non-steroidal anti-inflammatory drugs (NSAIDs) for nonspecific low back pain (Cochrane Review). In: The Cochrane Library, Issue 4, 2000. Oxford: Update Software.
- [18] Pohjalainen T, Jekunen A, Autio L, Vuorela H. Treatment of acute low back pain with the COX-2-selective anti-inflammatory drug Nimesulide: results of a randomized, double-blind comparative trial versus ibuprofen. *Spine* 2000; 25: 1579-85.
- [19] Van Tulder MW, Touray T, Furlan AD, Solway S, Bouter LM. Muscle relaxants for nonspecific low back pain (Cochrane Review). In: The Cochrane Library, Issue 1, 2004. Chichester, UK: John Wiley & Sons, Ltd.
- [20] Van Tulder MW, Koes BW, Bouter LM. Conservative treatment of acute and chronic nonspecific low back pain: a systematic review of randomized controlled trials of the most common interventions. *Spine* 1997; 22: 2128-56.
- [21] Henry D, Lim LLY, Rodriguez LAG, et al. Variability in risk of gastrointestinal complications with individual nonsteroidal anti-inflammatory drugs: results of a collaborative meta-analysis. *Br Med J* 1996; 312: 1563-6
- [22] van Tulder M, Becker A, Bekkering T, Breen A, del Real MT, Hutchinson A, Koes B, Laerum E, Malmivaara A; COST B13 Working Group on Guidelines for the Management of Acute Low Back Pain in Primary Care. Chapter 3. European guidelines for the management of acute nonspecific low back pain in primary care. *Eur Spine J*. 2006 Mar;15 Suppl 2:S169-91.
- [23] Keel P, Perini Ch, Schutz-Petitjean D, et al. Chronicisation des douleurs du dos: problematique, issues. Rapport final du Programme National de Recherche No 26B. Bale: Editions EULAR 1996. [Switzerland].
- [24] Keel P, Weber M, Roux E, et al. Kreuzschmerzen: Hintergründe, prävention, behandlung. Basisdokumentation. Verbindung der Schweizer Ärzte (FMH), Bern, 1998. [Switzerland]
- [25] Araki S, Kawamura O, Mataka T, et al. RCT ni yoru kyusei yotsu-sho ni taisuru shishin-gun to gishin-gun no tiryoku koka [Randomized controlled trial comparing manual acupuncture and sham acupuncture for acute low back pain]. *J Japan Soc Acupuncture Moxibustion* 2001; 51: 382.
- [26] Van Tulder MW, Ostelo RWJG, Vlaeyen JWS, Linton SJ, Morley SJ, Assendelft WJJ. Behavioural treatment for chronic low back pain (Cochrane Review). In: The Cochrane Library, Issue 4, 2000. Oxford: Update Software.
- [27] Melloh M, Aebli N, Elfering A, Röder C, Zweig T, Barz T, Herbison P, Hendrick P, Bajracharya S, Stout K, Theis JC. Development of a screening tool predicting the transition from acute to chronic low back pain for patients in a GP setting: protocol of a multinational prospective cohort study. *BMC Musculoskelet Disord*. 2008 Dec 19;9:167.
- [28] Dillingham T. Evaluation and management of low backpain: and overview. *State of the Art Reviews* 1995;9(3):559-74.

- [29] Leboeuf-Yde C, Lauritsen J, Lauritsen T. Why has the search for causes of low backpain largely been nonconclusive? *Spine* 1997;22(8):877-81.
- [30] Dankaerts W, O'Sullivan PB, Burnett AF, Straker LM. The use of a mechanism-based classification system to evaluate and direct management of a patient with non-specific chronic low back pain and motor control impairment--a case report. *Man Ther.* 2007 May;12(2):181-91.
- [31] Dankaerts W, O'Sullivan P. The validity of O'Sullivan's classification system (CS) for a sub-group of NS-CLBP with motor control impairment (MCI): overview of a series of studies and review of the literature. *Man Ther.* 2011 Feb;16(1):9-14.
- [32] O'Sullivan P. Diagnosis and classification of chronic low back pain disorders: maladaptive movement and motor control impairments as underlying mechanism. *Man Ther.* 2005 Nov;10(4):242-55.
- [33] Carragee EJ, Hannibal M (2004) Diagnostic evaluation of low back pain. *Orthop Clin North Am*, 35(1): 7-16.
- [34] Kendall NAS, Linton SJ, Main CJ (1997) Guide to assessing psychosocial yellow flags in acute low back pain: risk factors for long-term disability and work loss., Accident Rehabilitation & Compensation Insurance Corporation of New Zealand and the National Health Committee.: Wellington.
- [35] Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kovacs F, Mannion AF, Reis S, Staal JB, Ursin H, Zanoli G; COST B13 Working Group on Guidelines for Chronic Low Back Pain. Chapter 4. European guidelines for the management of chronic nonspecific low back pain. *Eur Spine J.* 2006 Mar;15 Suppl 2:S192-300.
- [36] Chou R, Qaseem A, Snow V, Casey D, Cross JT Jr, Shekelle P, Owens DK; Clinical Efficacy Assessment Subcommittee of the American College of Physicians; American College of Physicians; American Pain Society Low Back Pain Guidelines Panel. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society *Ann Intern Med.* 2007 Oct 2;147(7):478-91
- [37] Todd NV. Cauda equina syndrome: the timing of surgery probably does influence outcome. *Br J Neurosurg.* 2005;19:301-6; discussion 307-8.
- [38] Tsiodras S, Falagas ME. Clinical assessment and medical treatment of spine infections. *Clin Orthop Relat Res.* 2006;444:38-50.
- [39] Loblaw DA, Perry J, Chambers A, Laperriere NJ. Systematic review of the diagnosis and management of malignant extradural spinal cord compression: the Cancer Care Ontario Practice Guidelines Initiative's Neuro-Oncology Disease Site Group. *J Clin Oncol.* 2005;23:2028-37.
- [40] Bigos SJ, Bowyer OR, Braen GR, al. e (1994) Clinical Practice Guidelines. Vol. 14, Public Health Service Edition., US Department of Health an Human Services.
- [41] Hides JA, Jull GA, Richardson CA. Long-term effects of specific stabilizing exercises for first-episode low back pain. *Spine.* 2001;26:E243-248.
- [42] Hides JA, Stokes MJ, Saide M, Jull GA, Cooper DH. Evidence of lumbar multifidus muscle wasting ipsilateral to symptoms in patients with acute/subacute low back pain. *Spine.*

- [43] Kiesel KB, Uhl TL, Underwood FB, Rodd DW, Nitz AJ. Measurement of lumbar multifidus muscle contraction with rehabilitative ultrasound imaging. *Man Ther.* 2007;12:161-166.
- [44] Kristjansson E. Reliability of ultrasonography for the cervical multifidus muscle in asymptomatic and symptomatic subjects. *Man Ther.* 2004;9:83-88.
- [45] Lee JP, Tseng WY, Shau YW, Wang CL, Wang HK, Wang SF. Measurement of segmental cervical multifidus contraction by ultrasonography in asymptomatic adults. *Man Ther.* 2006 Sep 18; [Epub ahead of print].
- [46] Rankin G, Stokes M, Newham DJ. Size and shape of the posterior neck muscles measured by ultrasound imaging: normal values in males and females of different ages. *Man Ther.* 2005;10:108-115.
- [47] Stokes M, Rankin G, Newham DJ. Ultrasound imaging of lumbar multifidus muscle: normal reference ranges for measurements and practical guidance on the technique. *Man Ther.* 2005;10:116-126.
- [48] Strobel K, Hodler J, Meyer DC, Pfirrmann CW, Pirkel C, Zanetti M. Fatty atrophy of supraspinatus and infraspinatus muscles: accuracy of US. *Radiology.* 2005;237:584-589.
- [49] Teyhen DS, Gill NW, Whittaker JL, Henry SM, Hides JA, Hodges P. Rehabilitative ultrasound imaging of the abdominal muscles. *J Orthop Sports Phys Ther.* 2007 Aug;37(8):450-66.
- [50] Stokes M, Hides J, Elliott J, Kiesel K, Hodges P. Rehabilitative ultrasound imaging of the posterior paraspinal muscles. *J Orthop Sports Phys Ther.* 2007 Oct;37(10):581-95.
- [51] Whittaker JL, Teyhen DS, Elliott JM, Cook K, Langevin HM, Dahl HH, Stokes M. Rehabilitative ultrasound imaging: understanding the technology and its applications. *J Orthop Sports Phys Ther.* 2007 Aug;37(8):434-49.
- [52] Kiesel KB, Uhl T, Underwood FB, Nitz AJ. Rehabilitative ultrasound measurement of select trunk muscle activation during induced pain. *Man Ther.* 2008 May;13(2):132-8.
- [53] Sackett DL, Strauss SE, Richardson WS, Rosenberg W, Haynes RB.). *Medicina basada en la evidencia. cómo practicar y enseñar la MBE (2ª ed)* Ed Harcourt. 2001
- [54] Sackett DL, Richardson WS, Rosenberg W, Hynes RB. *Evidence-based medicine: How to practice and teach EBM.* London: Churchill-livingstone. 1997
- [55] Herbert RD, Jamtvedt G, Mead J, Birger K. *Practical evidence-based physiotherapy* Ed. Butterworth-Heinemann. 2005
- [56] Herbert RD. How to estimate treatment effects from reports of clinical trials. I: Continuous outcomes. *Aus J Pyhsio*, 2000 (46), 229-235.
- [57] CEBP. Center Evidence-based Physiotherapy Tutorial: Reading clinical trials in physiotherapy. Tutorial: Reading clinical trials in physiotherapy. Retrieved 23/12, 2011, from http://www.pedro.fhs.usyd.edu.au/CEBP/index_cebp.html
- [58] Oxman AD, Guyatt GH. Validation of an index of the quality of review articles. *J Clin Epidemiol*, 1991. 44(11): 1271-8.
- [59] Hurley DA, Minder PM, McDonough SM, Walsh DM, Moore AP, Baxter DG. Interferential therapy electrode placement technique in acute low back pain: a preliminary investigation. *Arch Phys Med Rehabil*, 2001. 82(4): 485-93.

- [60] Werners R, Pynsent PB, Bulstrode CJ. Randomized trial comparing interferential therapy with motorized lumbar traction and massage in the management of low back pain in a primary care setting. *Spine*, 1999. 24(15): 1579-84.
- [61] Basford JR, Sheffield CG, Harmsen WS. Laser therapy: a randomized, controlled trial of the effects of low-intensity Nd:YAG laser irradiation on musculoskeletal back pain. *Arch Phys Med Rehabil*, 1999; 80(6): 647-52.
- [62] Bjordal JM, Couppe C, Chow RT, Tuner J, Ljunggren EA. A systematic review of low level laser therapy with location-specific doses for pain from chronic joint disorders. *Aust J Physiother*. 2003, 49(2): 107-16.
- [63] Jellema P, van Tulder MW, van Poppel MN, Nachemson AL, Bouter LM. Lumbar supports for prevention and treatment of low back pain: a systematic review within the framework of the Cochrane Back Review Group. *Spine*. 2001 26(4): 377-86.
- [64] van Duijvenbode I, Jellema P, van Poppel MNM, van Tulder MW. Lumbar supports for prevention and treatment of low back pain. *Cochrane Database of Systematic Reviews*, issue 2 2008. Chichester: John Wiley & Sons Ltd; 2008.
- [65] Sweetman BJ, Heinrich I, Anderson JAD (1993) A randomized controlled trial of exercises, short wave diathermy, and traction for low back pain, with evidence of diagnosis-related response to treatment. *Journal-of-Orthopaedic-Rheumatology*, 6: 159-66.
- [66] Philadelphia (2001) Philadelphia Panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain. *Phys Ther*, 81(10): 1641-74.
- [67] van der Heijden GJ, Beurskens AJ, Koes BW, Assendelft WJ, de Vet HC, Bouter LM (1995) The efficacy of traction for back and neck pain: a systematic, blinded review of randomized clinical trial methods. *Phys Ther*, 75(2): 93-104.
- [68] van den Hoogen HM, Koes BW, van Eijk JT, Bouter LM (1995) On the accuracy of history, physical examination, and erythrocyte sedimentation rate in diagnosing low back pain in general practice. A criteria-based review of the literature. *Spine*, 20(3): 318-27.
- [69] Brosseau L, Milne S, Robinson V, Marchand S, Shea B, Wells G, Tugwell P (2002) Efficacy of the transcutaneous electrical nerve stimulation for the treatment of chronic low back pain: a meta-analysis. *Spine*, 27(6): 596-603.
- [70] Milne S, Welch V, Brosseau L, Saginur M, Shea B, Tugwell P, Wells G (2001) Transcutaneous electrical nerve stimulation (TENS) for chronic low back pain. *Cochrane Database Syst Rev*, (2): CD003008.
- [71] Hsieh RL, Lee WC (2002) One-shot percutaneous electrical nerve stimulation vs. transcutaneous electrical nerve stimulation for low back pain: comparison of therapeutic effects. *Am J Phys Med Rehabil*, 81(11): 838-43.
- [72] Yokoyama M, Sun X, Oku S, Taga N, Sato K, Mizobuchi S, Takahashi T, Morita K (2004) Comparison of percutaneous electrical nerve stimulation with transcutaneous electrical nerve stimulation for long-term pain relief in patients with chronic low back pain. *Anesth Analg*, 98(6): 1552-6.
- [73] UK BEAM Trial Team. Brealey S, Coulton S, Farrin A, Morton V, Torgerson D, Burton AK, Garratt A, Harvey E, Letley L, Martin J, Vickers M, Whyte K, Manca A, Klaber Moffett J, Russell I, Underwood M, Williams M (2004a) United Kingdom back pain

- exercise and manipulation (UK BEAM) randomised trial: Cost-effectiveness of physical treatments for back pain in primary care. *British Medical Journal*, 329(7479):1381
- [74] Licciardone JC, Stoll ST, Fulda KG, Russo DP, Siu J, Winn W, Swift J, Jr. (2003) Osteopathic manipulative treatment for chronic low back pain: a randomized controlled trial. *Spine*, 28(13): 1355-62.
- [75] Furlan AD, Brosseau L, Imamura M, Irvin E (2002) Massage for low-back pain: a systematic review within the framework of the Cochrane Collaboration Back Review Group. *Spine*, 27(17): 1896-910.
- [76] Hernandez-Reif M, Field T, Krasnegor J, Theakston H (2001) Lower back pain is reduced and range of motion increased after massage therapy. *Int J Neurosci*, 106(3-4): 131-45.
- [77] Walach H, Guthlin C, Konig M (2003) Efficacy of massage therapy in chronic pain: a pragmatic randomized trial. *J Altern Complement Med*, 9(6): 837-46.
- [78] Hsieh LL, Kuo CH, Yen MF, Chen TH (2004) A randomized controlled clinical trial for low back pain treated by acupressure and physical therapy. *Prev Med*, 39(1): 168-76.
- [79] van Tulder MW, Koes B (2003) Low back pain and sciatica: chronic. *Clin Evid*, (9).
- [80] van Tulder MW, Malmivaara A, Esmail R, al. e (2003) Exercise therapy for low back pain., *The Cochrane Library*: Oxford.
- [81] Staal JB, Hlobil H, Twisk JW, Smid T, Koke AJ, van Mechelen W (2004) Graded activity for low back pain in occupational health care: a randomized, controlled trial. *Ann Intern Med*, 140(2): 77-84.
- [82] Gur A, Karakoc M, Cevik R, Nas K, Sarac AJ (2003) Efficacy of low power laser therapy and exercise on pain and functions in chronic low back pain. *Lasers Surg Med*, 32(3): 233-8.
- [83] Jousset N, Fanello S, Bontoux L, Dubus V, Billabert C, Vielle B, Roquelaure Y, Penneau-Fontbonne D, Richard I (2004) Effects of functional restoration versus 3 hours per week physical therapy: a randomized controlled study. *Spine*, 29(5): 487- 93; discussion 94.
- [84] Assendelft WJ, Morton SC, Yu EI, Suttorp MJ, Shekelle PG (2004) Spinal manipulative therapy for low-back pain (Cochrane Review). In: *The Cochrane Library*, Issue 3. John Wiley & Sons, Ltd.: Chichester, UK.
- [85] Low Back Pain: Early Management of Persistent Non-specific Low Back Pain [Internet]. National Collaborating Centre for Primary Care (UK). London: Royal College of General Practitioners (UK); 2009 May.
- [86] Haskell WL, Lee IM, Pate RR, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc*. 2007. Aug;39(8);1423-34.
- [87] Sato D, Kaneda K, Wakabayashi H, Nomura T. Comparison two-year effects of once-weekly and twice-weekly water exercise on health-related quality of life of community-dwelling frail elderly people at a day-service facility. *Disabil Rehabil*. 2009;31;84-93.

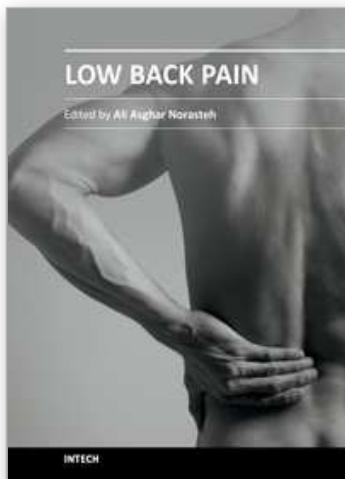
- [88] Rainville J, Jouve CA, Hartigan C, Martinez E, Hipona M. Comparison of short- and long-term outcomes for aggressive spine rehabilitation delivered two versus three times per week. *Spine J.* 2002;2;402–407.
- [89] Mannion AF, Müntener M, Taimela S, Dvorak J. Comparison of three active therapies for chronic low back pain: results of a randomized clinical trial with one-year follow-up. *Rheumatology.* 2001; 40 (7):772-778.
- [90] Hayden JA, van Tulder MW, Malmivaara A, Koes BW. Exercise therapy for treatment of non-specific low back pain. *Cochrane Database of Systematic Reviews*, Issue 3 2006. Chichester: John Wiley & Sons Ltd; 2005.
- [91] Cuesta-Vargas AI, García-Romero JC, Dediego-Acosta AM, González-Sánchez M, Labajos-Manzanares MT. Clinical effect of deep water running on non-specific low back pain: A randomised trial. *SA Journal of Physiotherapy.* 2009 VOL 65 n° 3 pp1-8.
- [92] Cuesta-Vargas A, Garcia-Romero JC, Kuisma R. Maximum and Resting Heart Rate in Treadmill and Deep-Water Running in Male. *International Volleyball Players. International Journal of Aquatic Research and Education*, 2009, 3, pp 398-405
- [93] Cuesta-Vargas AI, Gonzalez-Sanchez M, Garcia Romero JC, Labajos-Manzanares MT. Efectividad clínica de un programa de fisioterapia multimodal complementado con carrera acuática de alta intensidad sobre la lumbalgia. Un estudio con evaluación previa en el postest. *Fisioterapia*; 2010, 32(1): pp 17–24
- [94] Storheim K, Brox JL, Holm I, Koller AK, Bo K (2003) Intensive group training versus cognitive intervention in sub-acute low back pain: short-term results of a single-blind randomized controlled trial. *J Rehabil Med*, 35(3): 132-40.
- [95] Karjalainen K, Malmivaara A, Mutanen P, Roine R, Hurri H, Pohjolainen T (2004) Mini-intervention for subacute low back pain: two-year follow-up and modifiers of effectiveness. *Spine*, 29(10): 1069-76.
- [96] Frost H, Lamb SE, Doll HA, Carver PT, Stewart-Brown S (2004) Randomised controlled trial of physiotherapy compared with advice for low back pain. *Bmj*, 329(7468): 708.
- [97] Cherkin DC, Eisenberg D, Sherman KJ, Barlow W, Kaptchuk TJ, Street J, Deyo RA (2001) Randomized trial comparing traditional Chinese medical acupuncture, therapeutic massage, and self-care education for chronic low back pain. *Arch Intern Med*, 161(8): 1081-8.
- [98] Karjalainen K, Malmivaara A, Pohjolainen T, Hurri H, Mutanen P, Rissanen P, Pahkajarvi H, Levon H, Karpoff H, Roine R (2003) Mini-intervention for subacute low back pain: a randomized controlled trial. *Spine*, 28(6): 533-40; discussion 40-1.
- [99] Skinner BF (1953) *Science and Human Behaviour*. New York: The Macmillan Co.
- [100] van Tulder MW, Ostelo RW, Vlaeyen JW, Linton SJ, Morley SJ, Assendelft WJ (2004) Behavioural treatment for chronic low back pain (Cochrane Review). In: *The Cochrane Library*, Issue 3. John Wiley & Sons, Ltd: Chichester, UK.
- [101] Ostelo RWJG, de Vet HC, Vlaeyen J, Kerkhoffs MR, Berfelo WM, Wolters PMJC, van den Brandt PA (2003) Behavioral graded activity following first-time lumbar disc surgery. 1- year results of a randomized clinical trial. *Spine*, 28: 1757-65.

- [102] Spinhoven P, Ter Kuile M, Kole-Snijders AM, Hutten Mansfeld M, Den Ouden DJ, Vlaeyen JW (2004) Catastrophizing and internal pain control as mediators of outcome in the multidisciplinary treatment of chronic low back pain. *Eur J Pain*, 8(3): 211-9.
- [103] Brox JL, Sorensen R, Friis A, Nygaard O, Indahl A, Keller A, Ingebrigtsen T, Eriksen HR, Holm I, Koller AK, Riise R, Reikeras O (2003) Randomized clinical trial of lumbar instrumented fusion and cognitive intervention and exercises in patients with chronic low back pain and disc degeneration. *Spine*, 28(17): 1913-21.
- [104] van den Hout JH, Vlaeyen JW, Heuts PH, Zijlema JH, Wijnen JA (2003) Secondary prevention of work-related disability in nonspecific low back pain: does problem-solving therapy help? A randomized clinical trial. *Clin J Pain*, 19(2): 87-96.
- [105] Critchley DJ, Ratcliffe J, Noonan S, Jones RH et al. Effectiveness and cost-effectiveness of three types of physiotherapy used to reduce chronic low back pain disability: a pragmatic randomized trial with economic evaluation. *Spine*. 2007; 32 (14):1474-1481.
- [106] Haldorsen EM, Grasdahl AL, Skouen JS, Risa AE, Kronholm K, Ursin H (2002) Is there a right treatment for a particular patient group? Comparison of ordinary treatment, light multidisciplinary treatment, and extensive multidisciplinary treatment for long-term sick-listed employees with musculoskeletal pain. *Pain*, 95(1-2): 49-63.
- [107] Guzman J, Esmail R, Karjalainen K, Malmivaara A, Irvin E, Bombardier C (2001) Multidisciplinary rehabilitation for chronic low back pain: systematic review. *BMJ*, 322(7301): 1511-6.
- [108] Bendix T, Bendix A, Labriola M, Hastrup C, Ebbelohj N (2000) Functional restoration versus outpatient physical training in chronic low back pain: a randomized comparative study. *Spine*, 25(19): 2494-500.
- [109] Schonstein E, Kenny D, Keating J, Koes B, Herbert RD (2003) Physical conditioning programs for workers with back and neck pain: a cochrane systematic review. *Spine*, 28(19): E391-5.
- [110] Friedrich M, Gittler G, Arendasy M, Friedrich KM. Long-term effect of a combined exercise and motivational program on the level of disability of patients with chronic low back pain. *Spine*. 2005; 30 (9):995-1000.
- [111] Kääpä EH, Frantsi K, Sarna S, Malmivaara A. Multidisciplinary group rehabilitation versus individual physiotherapy for chronic nonspecific low back pain: a randomized trial. *Spine*. 2006; 31 (4):371-376.
- [112] Smeets RJE, Vlaeyen JWS, Hidding A, Kester ADM et al. Chronic low back pain: physical training, graded activity with problem solving training, or both? The one-year post-treatment results of a randomized controlled trial. *Pain*. 2008; 134 (3):263-276.
- [113] Mangwani J, Giles C, Mullins M, et al. Obesity and recovery from lower back pain: a prospective study to investigate the effect of body mass index on recovery from lower back pain. *Ann R Coll Surg Engl*. 2010;92(1):23-26.

- [114] Sato D, Kaneda K, Wakabayashi H, Nomura T. The water exercise improves health-related quality of life of frail elderly people at day service facility. *Qual Life Res.* 2007;16;1577-85.

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This book includes two sections. Section one is about basic science, epidemiology, risk factors and evaluation, section two is about clinical science especially different approach in exercise therapy. I envisage that this book will provide helpful information and guidance for all those practitioners involved with managing people with back pain-physiotherapists, osteopaths, chiropractors and doctors of orthopedics, rheumatology, rehabilitation and manual medicine. Likewise for students of movement and those who are involved in re-educating movement-exercise physiologists, Pilates and yoga teachers etc.

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