

Physical Exercise as a Treatment in the Management of Low Back Pain

Gabriel Anchía Hernández^{1*}, Juan Diego Zamora Salas²

¹Ministerio de Educación Pública, San José, Costa Rica, ²Escuela de Educación Física y Deportes, Universidad de Costa Rica, San José, Costa Rica

ABSTRACT

Low back pain is a condition that has great economic and social repercussions and has become one of the leading causes of incapacity for work globally. When pain occurs in the lower back, uncertainty is generated about the risk factors or causes that can trigger low back pain, however; its diagnosis is not simple and about 90% of cases generally do not present some type of demonstrable lesion, so the problem is classified as a non-specific low back pain. The treatment includes movement of the person, since rest weakens and atrophies the muscles of the back, in addition; among the recommended exercise methods are exercises located in the muscles of the trunk and abdomen mainly, muscular resistance, spinal stability, Pilates, Williams and Mckenzie exercises, Feldenkrais and Alexander techniques, among others.

Keywords: Low back pain; Physical therapy techniques; Therapy exercise; Treatment

INTRODUCTION

Low back pain is one of the main causes of consultation in health centers, characterized by pain or discomfort in the lumbar area, which is located between the lower edge of the last ribs and the lower fold of the gluteal area; with or without irradiation to one or both legs [1]. It can also compromise musculoskeletal and ligament structures, with or without functional limitation [2].

Low back pain can be classified according to its level of disability in acute when the pain is less than three months long, which are very common in the population or chronic when the pain is greater than that period and can cause severe disabilities. Acute low back pain rarely becomes a dangerous pathology and usually the pain is not specific and accurate diagnosis is not possible to make [2].

In developed countries, the economic cost of back pain has been estimated at 1.7% of gross national product revenues and 0.9% of the total cost of health care [3]. In the United States, the impact of this pathology reflects an expenditure of 20-50 billion dollars per year [4]. Some expenses associated with low back pain include loss of work productivity, decreased work income, medical expenses, rehabilitation, surgical interventions, and costs of severe pain that limits daily functionality [3].

Because it is estimated that between 60-70% of adults have an episode of lumbar pain syndrome throughout their lives [5],

which generates difficulty performing activities of daily living and can cause incapacity for work along with the millionaire losses to the various health systems [2], the need arises to identify possible therapeutic processes that allow people suffering from low back pain to recover more quickly, so it is proposed as an objective for this work to publicize the benefits of physical activity and some exercise methodologies as therapeutic resources in the reduction of pain and in prompt recovery of the range of motion after an episode of low back pain.

LITERATURE REVIEW

Benefits of physical activity in the patient with low back pain

Most cases of patients with back pain (90%) can be monitored by the primary care physician, only 10% have to be referred to specialists at another level of care; this is because approximately 90% of low back pain can be classified as non-specific. As a general rule, absolute rest is contraindicated, since it prolongs the state of low back pain and incapacity for work, the best recommendation is to maintain the highest degree of physical activity that the pain allows, and if in any case bed rest is necessary, it should be as short as possible and last a maximum of two days, since it is estimated that each day of bed rest entails a loss of 2% of muscle strength [6].

Correspondence to: Gabriel Anchía Hernández, Ministerio de Educación Pública, San José, Costa Rica, Tel: +50688433352; E-mail: anchia78@gmail.com

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Among passive treatments, usual medical treatment, including massage, analgesics, and bed rest, the evidence for short-term pain improvement is moderate [7]. Among active interventions, vertebral segmental stabilization exercises represent a greater reduction in functional disability as well as pain intensity in the treatment of chronic nonspecific mechanical low back pain compared to conservative treatment programs [7].

There is a significant reduction in pain and an improvement in functional capacity in the short and long term in patients with acute low back pain who maintain activity compared to those who rest; the period of incapacity for work and chronicity are also lower in those who maintain activity [8]. Also patients who remain in an active state and continue with normal activities of daily living, including work, have an earlier recovery of symptoms, reducing disability [5].

In sub-acute low back pain, the performance of scheduled exercises in the workplace decreases absenteeism, however; there is no evidence of what type of exercise or duration would be the most appropriate in this type of low back pain. On the other hand, in patients with low back pain of more than four weeks duration, the realization of an exercise program decreases pain and disability at three months, although these benefits are not maintained in the long term. Exercise has been identified as effective as other conservative treatments in decreasing pain and increasing functional capacity in patients with chronic low back pain; In addition, it reduces the days of disability in people with this type of low back pain. However, for Pérez et al. [9], stretching exercises are not more effective than other exercises in the treatment of low back pain.

Since 1904, it has been recognized that physical activity is an important factor in the prevention and treatment of low back pain, and that the benefits derived from physical activity are deduced in part if the harmful effects of immobilization or inactivity on the articular cartilage and especially on the tissues of the spine are taken into account [10]. Physical inactivity generates loss of coordination and muscle power and subsequently atrophy occurs; in cases of chronic low back pain, these factors constitute a vicious circle and hinder spontaneous recovery; on the contrary, recommendations focused on maintaining and improving physical activity imply a reduction in the time of incapacity for work in patients with non-specific sub-acute low back pain; in these cases, exercise appears to be an efficient method and combining it with behavioral therapy has proven to be very effective, although so far no specific exercise technique has been suggested as superior to another [9].

On the other hand, there seems to be a relationship between physical activity, aerobic capacity and low back pain since people with back problems tend to reduce their levels of physical activity and lose cardiovascular capacity; although it is sometimes difficult to determine if the reduction of physical activity and poor cardiovascular capacity are causal factors or the consequence of low back pain, for example; low-impact aerobic exercise appears to improve cardiovascular fitness in people with low back pain without the risk of an exacerbation [10].

Exercise is among the most prescribed treatments for patients with chronic low back pain, as it can be very useful in the processes to resume daily activity and favor the return to work activities. Several authors have agreed that the physical exercise applied in chronic low back pain is more effective than other

therapies used; if this statement is taken into account and it is added that it is a physiological therapy, easy, cheap and without side effects (if it is done correctly), it can be said that it is a choice in the processes of chronic low back pain [9].

The benefits of exercise in reducing the intensity of low back pain have been seen to occur in programs with a greater number of weeks of duration, showing improvements of 60% for training programs of 14 weeks duration and 50% for training programs of 8 and 12 weeks; In addition to the duration of the training program, the intensity of the training program also seems to influence, in such a way that the greater the intensity, the greater the improvements in low back pain [11]. For Pérez et al. [9], one of the problems that exercise can have would be the appearance of pain within 24-48 hours of performing the exercise, which would be normal, pains caused by micro ruptures in the muscle fibers and not an exacerbation of the process. This could lead the patient to the mistake of thinking that exercise is more than beneficial is harmful, a fact that should be taken into account by health personnel to dissuade or prevent the patient from this false belief [10]. It is very important and of great interest in adherence to exercise-based treatment and in good long-term results that the patient's exercise program is supervised by a person trained for it, since it has been proven that this is associated with a maintenance of the benefits obtained in patients with chronic low back pain; in addition, the supervision of the training allows the person in charge of this task to adjust the rehabilitation program to the progress that occurs in the patient [10].

Among the benefits of exercise practice are the reduction of pain, muscle strengthening, reduction of mechanical tension of vertebral structures, improvement of physical condition, prevention of injuries and improvement of posture and mobility of patients with lower back pain [12].

For Twomey et al. [13], exercise and movements cause alternating compression and relaxation of the articular cartilage and ensures the movement of synovial fluid in the articular cartilage as the area of pressure changes on the surface, this allows good health and optimal functioning of the articular cartilage, in addition to maintaining thicker and stronger ligaments which influences its functioning, flexibility and makes the bone-ligament-bone complex stronger. According to the same researcher, the practice of exercise improves the nutrition and health of the intervertebral discs and at the same time reduces the risk of developing osteoarthritis and osteoarthritic changes, which has been shown to begin only in areas where collagen has not been stressed much by movement and pressure. There is a positive relationship between low- and moderate-impact aerobic exercise and decreased low back pain [14].

Van Middelkoop et al. [15], demonstrated in his study in which he used an exercise therapy as a treatment in chronic pain in the lower back, that general exercises such as localized, low-impact aerobic type, stretching, etc., improve low back pain by reducing the intensity of low back pain favoring the recovery of the patient, achieving, reducing absences or work disabilities.

Exercise therapy seems to be the most widely used physical therapy intervention in the treatment of people with back pain; its goal is to decrease or eliminate pain, restore and maintain range of motion, improve the strength and endurance of lumbar and abdominal muscles, which contribute to the prompt

restoration of normal function, providing a minimal chance of relapse [16]. The types of exercises most commonly used for recovery in patients with low back pain include strengthening exercises for trunk musculature, range of motion, stretching, aerobic exercises, as well as balance training to improve trunk and abdominal control, stabilization and resistance exercises [12].

Specific exercise for people suffering from low back pain usually involves a rehabilitative program where exercises are incorporated for the extensor muscles of the back, trunk flexors (abdominal muscles), lateral trunk flexors (lateral abdominals), as they are important for the stabilization of the trunk during a variety of activities [17].

It has been proven that the incorporation of exercise, both in its aerobic modality, as well as flexibility and strengthening of the trunk muscles, can decrease the frequency and intensity of recurrences of acute low back pain [6]. It has also been suggested that it is the weakness of the lumbar musculature (possibly a result of disuse) and not the weak abdominals that maintains a close relationship with low back pain; evidence consistently indicates the presence of weak and easily fatigued trunk extensors in populations with low back pain; patients with this condition also have a lower ratio of strength of the extensors of the trunk with respect to the flexors of the trunk in comparison with asymptomatic people, in addition; morphological changes have been described as atrophy of the lumbar muscles, transverse spinous and erector of the spine from the first episode of back pain, which poses a risk to the patient of future pathologies [10].

Although lumbar extensors appear to be the weak link in the development of low back pain (as opposed to trunk flexors), the physical preparation of all major muscle groups is important for the development of overall functional ability and the health benefits associated with physical activity; therefore, although lumbar extenders should be the target of low back pain prevention and rehabilitation, a well-developed program of postures and movements that incorporates a variety of muscle resistance exercises should be followed progressively [11].

On the other hand, the low resistance of the back muscles has been associated with low back pain and is considered an underestimated component within the physical rehabilitation program, it is even mentioned that resistance work is more important than muscle strength in the lower back. Endurance is defined as the ability to perform prolonged episodes of work without experiencing much fatigue or exhaustion; specifically at the muscular level is the ability of a muscle to contract repeatedly or generate tension, maintain that tension and resist fatigue for an extended period of time; the type of resistance exercise is both rhythmic and repetitive, natural or static with resulting fatigue limiting the local muscle group being exercised [18].

Resistance exercises incorporating back extensors and abdominal muscles have been proposed for the treatment of low back pain, possibly because people with higher levels of endurance, muscle strength, and better cardiovascular fitness tend to have fewer spine problems [12].

One study revealed that trunk resistance training with localized exercises such as trunk extension reduces pain and improves function three weeks after the start of treatment; it was performed to evaluate the efficacy of trunk extensor muscle resistance training on pain and disability in patients with sub-

acute lower back pain (seven days to seven weeks from the onset of pain) [19]. Other researchers compared the efficacy of McKenzie exercise, resistance training, and resistance training with back care education and concluded that McKenzie exercise was effective in long-term modulation in lower back pain and proposed that combination therapy involving resistance training with McKenzie exercise was more effective [20].

Among the most mechanically used methods to treat low back pain are:

Williams's exercises: According to Liemohn et al. [10], Williams' exercises are based on trunk bending movements and began in the 1930's, which were widely employed over the next three to four decades.

These exercises tend to be better tolerated by patients, so it is recommended to start with this type of treatment to strengthen and improve the superficial and deep lumbar and abdominal muscles. In the introduction to his exercise program, Williams advised, "Remember, sit, stand, walk, and lie down in a way that minimizes lumbar lordosis" [10]. Williams's flexion exercises are recommended in patients with chronic lumbar pain syndrome, in conjunction with postural spine hygiene techniques. Their realization should be progressive and tolerant; the ideal is to carry them out at least three to four times a week. It is recommended that all exercises be supervised [21].

Williams' exercise program includes:

- a) Trunk flexion exercises (squat) or what is popularly known as abdominal exercises in a supine position with semi-flexed knees but must be performed without rising to more than 45 degrees or perform the full squat since disc compression forces are generated by the contraction of the psoas and hip flexors.
- b) The pelvic inclination is an exercise that is still highly recommended since it has a role as a strengthening exercise of the gluteus maximus muscle, where all the abdominal muscles and in particular the rectum of the abdomen also intervene. The pelvic tilt is also used as an elevator in the first phase of abdominal push-ups.
- c) Trunk flexion in the supine position is frequently employed as it relieves many people with low back pain by stretching the muscles and soft tissue structures of the spine. However, while it may be a comfortable posture for some people with low back pain, it may not be suitable for some with disc problems, such as ring tears. However, it is often recommended as an exercise in immediate intervention programs.
- d) The exercise of sitting and reaching although it is considered an exercise that can be used to stretch the hamstrings, stretch only one leg at a time, is the preferred way to perform this activity. Williams' instructions to bend the trunk slowly and gently forward avoid some of its drawbacks.
- e) With stretching in the iliotibial strap, Williams believed that the tightness of the iliotibial strap was a primary cause of the increased anterior inclination of the pelvis.
- f) Stand up from a small bench with the aim of strengthening the quadriceps and learning to replace the action of the legs with that of the back and thus reduce the disc pressure when putting the body in an upright position [10].

Spinal stabilization exercises: Spinal stabilization exercises

consist of protocols that address the activation and strengthening of the superficial and deep muscles of the trunk and abdomen, which appear to be effective for the treatment of chronic low back pain. A study to contrast the efficacy of two exercise programs, segmental stabilization and muscle strengthening of the trunk and abdomen, on pain, functional disability and activation of the transverse muscle of the abdomen in people with chronic lower back pain, concluded that this type of exercise effectively reduces pain and functional disability in people with these conditions, in addition; segmental stabilization improves the activation capacity of the transverse muscle of the abdomen [22].

Although the lumbo-pelvic stabilization approach appears to be useful for the treatment of lower back pain based on a solid biomechanical model (Panjabi hypothesis), the optimal type of exercise, duration or number of repetitions, among other variables, is not clear in addition; there is no strong evidence to conclude whether lumbo-pelvic stabilization programs provide better results than other different methods, such as Pilates, Yoga, or aerobics [23].

Pilates exercises: Wajswelner et al. [24], conducted a study to compare clinical physiotherapy using the Pilates method and general exercise to improve symptoms of chronic lower back pain, the results of which showed that the Pilates exercise program produced similar results to traditional general exercises in terms of benefits in reducing pain and disability, as well as in the improvement of the functionality of adults with chronic low back pain when both programs were applied by physiotherapists.

Feldenkrais and Alexander techniques: The Feldenkrais and Alexander techniques may be adjusted to other methods in some patients, particularly those who lack muscle control or a good awareness of their body. The Feldenkrais technique may be more useful in patients with low back pain than the Alexander technique, because it involves learning awareness about the body and muscle control; valuable aspects for patients with back problems to learn how to stabilize the trunk, however; the Alexander technique can be a particularly good support for teaching correct postures to some patients; therefore, both techniques are additional tools for those caring for patients with chronic low back pain [10].

DISCUSSION

The studies analyzed indicate that, for the treatment of acute low back pain, most cases resolve spontaneously within 4 weeks, so there is currently no effective treatment related to physical exercise [11]. Research indicates that various types of exercises have been used to treat low back pain with varying degrees of success, however; No research indicates a specific exercise protocol for the management of acute low back pain, so the recommendations of the hospital center regarding the guidelines for the management or relief of acute low back pain should be followed. It is important to point out that the treatment should not only focus on the management of low back pain through pharmacology, physical therapy, among others; rather, postural education, muscle strengthening, and a psychosocial component should be included in chronic cases [21]. Also, training with specific exercises for the back and abdomen muscles should preferably include strengthening of the transversus abdominis

multifidus muscle to reduce pain and disability in patients with chronic low back pain. This is in response to the antagonistic mechanism of lumbar muscle movement.

CONCLUSION

There is currently no effective treatment related to physical exercise for low back pain. The McKenzie method, Williams exercises, spinal stabilization exercises, Pilates exercises, and the Feldenkrais and Alexander techniques seem to be the most recommended exercises for managing chronic low back pain. However, more research is still needed on exercises for the relief or management of acute low back pain, since currently, only stretching and flexibility exercises are recommended for the treatment of acute low back pain. In addition, an interdisciplinary follow-up is recommended in patients with chronic low back pain, mainly due to the bio psychosocial changes to which they must undergo to reduce the condition.

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