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Original article

## CONTRIBUTION OF RADIOFREQUENCY, ELONGATION, AND LASER TO TREATING THE ACUTE LOW BACK PAIN OF ATHLETES

ȘTEFAN NEONIȚA GABRIELA<sup>1</sup>, MORARU CRISTINA ELENA<sup>1</sup>, TANASĂ RALUCA ANCA<sup>1</sup>,  
TOMOZEI RĂZVAN ANDREI<sup>1</sup>

### Abstract

**Objective.** The objective of this study was to demonstrate that a unique combination of latest modern therapies (Tear therapy, the BTL inversion table, the Astar Liamed high-power laser) may contribute to the successful training of athletes' acute low back pain.

**Methods.** The study was conducted on five male subjects, aged 28-35, practicing physical activity three times a week at the kinesiotherapy Practice within the Integrated Outpatient Service of the Military Hospital "Dr. Alexandru Popescu" in Focșani (the Vrancea County).

**Results.** After applying the kinesiotherapeutic program adapted for each subject diagnosed with acute low back pain, to which we subsequently added Tear therapy, low back elongations, and laser, the subjects made a 100% recovery. The recovery program lasted for 16 weeks, by observing the hygiene and safety standards and the standing regulations regarding the pandemic status in Romania, related to the Sars-Cov2 virus.

**Conclusions.** Upon applying the trio of modern therapies accompanying the kinesiotherapeutic program (recovery exercises), it may be stated that acute low back pain may be treated as follows: pain reduction on the VAS scale and lower discomfort, faster healing process, regained spine mobility, improved muscle tone and getting back to sports.

**Key Words:** Tear therapy, low back pain, elongation, athletes, recovery.

### Introduction

Low back pain is considered the most common painful condition among adults, thus among the most frequent causes of chronic or temporary invalidity among adults. Most patients who visit a specialist are affected by thoracic and low back and/or low back pain, with typical onset for bone pain. Some patients also suffer from severe unilateral and bilateral lower limb pain, leading to limited function (Deyo et. al., 1987, Andresson, 1999, Urwin et. al., 1998).

The prevalence of low back pain (traumatism not caused by medical conditions) across a life span is in the developed countries of 60% -70%. This means that 2 out of 3 persons have or will face such an issue sometime in their life, which may entail the idea that low back pain ranks in the top ten conditions impairing our body and our working capacity.

The "crossroad" or the point where the spine meets the pelvic area carries the entire load of the human torso and of the upper limbs, plus all the extra

weights we lift and carry on a daily basis. Hence, the low back spine has to perform many daily movements and loads, which may lead to numerous traumatism that may arise momentarily or across time, with major repercussions.

There are many causes for back pain. Each time, pain is a symptom; it does not represent the trauma per se. The main indicator for the cause generating pain is the duration and intensity of pain. Back pain with a sudden onset, many weeks before going to a specialist, is considered acute traumatism and it may be caused by a fall/injury/accident, or by lifting weights, by exaggerated movements performed in a faulty manner. If the pain is still present after three months, it becomes a chronic injury; it is less frequent than the acute version and it may be a common symptom for a series of diseases; clinical and biological, functional and imaging examinations are necessary to determine a correct diagnosis.

Laser therapy plays an extremely important role in the treatment of inflammatory pain causes. Laser therapy is a non-invasive, painless, and very quick therapy. The various wavelengths of laser tools

<sup>1</sup> "Alexandru Ioan Cuza" University Iasi, Faculty of Physical Education and Sport, Iasi, Romania  
Corresponding author: neonila\_gabriela@yahoo.com  
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have different diffusion and absorption capacity in the human tissues. Furthermore, modulated laser energy in terms of wavelength and emission power allows us to attain different depths in the human body, to treat various tissues; hence, we may touch the pain cause directly, thus making it disappear altogether (Zati et. al. 2006, Monici et. al., 2009, Peplow et. al., 2010, Emwemeka et. al. 2004). Alongside conventional medications, various techniques have been used to heal the traumatism, such as ultrasounds – a method used for preventing and treating traumas under pressure. One of these methods with great potential is laser therapy, used in medical applications (Naraqi, 2015).

In 2007, Gholamreza et al. argued that in low back pain, laser therapy combined with recovery exercise is more beneficial than long-term exercise, while Gocevska et al. highlight in 2019 that patients with back pain treated with high-intensity laser recorded significant back pain reduction and enhanced mobility; the positive effect lasted for three months. This seems to be an efficient, safe, and useful physical method for treating patients with back pain.

Dilek et al. in 2010 argued that ultrasound therapy was commonly applied for low back pain. Its mechanical action is considered predominant and it consists of the ultrasound pressure acting as a molecular vibration in the tissue. The analgesic effect of ultrasound therapy was also confirmed, leading to an improvement of functional lesions in patients with back pain.

Another study aimed to determine the impact of high-intensity laser on the pain and function of patients with chronic low back pain. Alayat et. al., 2014 reported that a combined treatment of exercises and high-intensity laser provided improved low back mobility, mitigated pain, and better function among patients. The authors pointed out that four weeks of laser and exercising led to statistically significant improvement of the VAS scale.

The system of elongation for the spine combines all benefits for conventional traction therapy, such as: comfortable position for the patient due to the innovating system of belts, the possibility of setting various therapeutical parameters. Vertebral elongations are indicated for subacute/chronic low back pain of a discal cause (discopathy, low back pain, herniated disc), of a musculo-ligamentary cause, or due to the impairment of posterior inter-

apophysis joints. The device is very subtle, not at all noisy; the painful area is totally decompressed. Elongation can make the spine more flexible, relax the contracted paravertebral muscles, stretch the ligaments and make them more flexible, reduce subluxations within inter-apophysis joints, increase the hydration of the intervertebral disc, and improve local microcirculation (www.btl.ro).

Low back traction is the process of applying lumbar vertebrae stretching force using the bodyweight, weights/and or a pulley to relax the individual low back spinal joints. The word traction derives from the Latin “*tractico*”, which means “a process of pulling”; various forms of spinal traction have been described, as early as the time of Hippocrates, to alleviate pain.

Several theories have been proposed to explain the possible clinical benefit of elongations. A relaxation of the movement segment is believed to change the position of the pulpous nucleus in relation to the posterior fibrous ring (Cox et. al., 1996, Pellicchia et al. 1994) or to change the disc-nerve interface (Knutsson et al. 2008). These effects are plausible based on studies examining low back spine kinematics during traction therapies. Aside from separating the vertebrae, traction has been shown to reduce the pressure of the pulpous nucleus (Ramos et al. 1994, Gudavalli et. al., 1997). However, the mechanical alterations noticed in a certain position are less likely to be supported after the patient resumes the vertical position, which actually carries the weight. Any durable clinical response to traction therapy would be more likely due to the effect of traction on the mechanobiology of the movement segment or of neuronal tissues.

Results of spinal tractions include pain mitigation, correct spinal alignment, and decompressed joints. Spinal traction stretches the back muscles and bones to combat the effects of gravity. With the help of other physical therapies, many people find spinal traction highly beneficial. The treatment reduces pain and the body becomes capable of self-healing. Some people require spinal traction therapy only for a short period, while others need it for the rest of their life.

## Methods

In what concerns the symptomatology of the athletes who came for recovery, we considered the type of pain: inflammatory pain at spine level, duration morning/nocturnal joint stiffness (which

may determine sleep disturbances), physical astheny, fatigability.

The documentation for the study was structured on anamnestic data: age, duration of the condition, presence of comorbidities and or extra-articular manifestations, previous medication, and physical-kinetic and balneary recovery treatment.

To formulate a correct clinical diagnosis, the patients underwent clinical examination, somatoscopic and/or somatometric examination, paraclinical examinations (depending on the case: low back spine ultrasound, MRI).

We used the following devices: in the kinesiotherapy practice: the Tecar Fizio Warm 7.0 Liamed device, the BTL inversion table, high-intensity laser from Astar Liamed.

In this study, we have assumed that – while being applied these modern therapies – the subjects benefit from the most complex treatment, adapted to individual needs. These are safe, efficient, non-invasive methods, well-tolerated by athletes; the treatment may begin in the acute phase (48 hours from the onset of the lesion), with minimum side effects.

Tecar is an electronic device generating sinusoidal current, transferred through the two electrodes on the area of the traumatism. The device detects and localises inflammation, generates heat; it is a reliable indicator for an optimal point of application and repeatability ([www.fisiowarm.com](http://www.fisiowarm.com)).

The inversion table helps by decompressing internally the spinal discs. This method does not require surgical interventions; choosing such a method may eliminate the risk of surgery. By addressing all types of back pain, the mechanical decompression process functions by pulling slightly and slowly the spinal discs, paying great attention to the integrity of the spine. During the elongations, through cycles with phases of distraction and relaxation and with correct positioning, we can isolate a vertebral disc and place it under negative pressure, thus causing a void effect within it. The void effect performs two mechanical works, the material of the protruding or herniated disc may be pulled back to the disc through the void created within it. The void within the disc stimulates an

increase in blood supply. It leads to significant pain mitigation and to the recovery of the impaired area ([www.btl.ro](http://www.btl.ro)).

High-power laser is the most performant laser therapy in the world; it rapidly became the standard of care in acute and chronic pain mitigation. This technology has 85% - 90% efficiency rate in pain and inflammation mitigation, which eliminates the risk of surgery, without negative side effects. It is a painless, non-traumatic, aseptic therapy; it does not emit ionising radiations, beneficial for athletes.

Hence, it is highly recommended for the recovery process to be accompanied by kinesiotherapy and other additional, complementary therapies, (the consequences are noticed immediately and they are long-term).

#### *Experimental design*

Participants: 5 athletes, aged 28-35, with a diagnosis of acute low back pain, as a result of spinal disc injury, with severe and dull pain, with sudden onset after weight lift or abrupt movement.

The study was designed only for the subjects with the diagnosis mentioned above; the specialist physician provided a 6-month prognosis for resuming sorts activity.

The recovery treatment and the therapeutic plan were structured as follows:

- the kinesiotherapy program comprised active mobilisations, rigid mobilisations, exercises on the gym bench;
- weeks 1 and 3 (Tecar therapy daily, kinesiotherapy daily, low back elongations x3/week, laser daily), week 2 and 4 (Tecar X 3/week, kinesiotherapy daily, laser X 2/week);
- week 5 and 7 (Tecar daily, kinesiotherapy daily, elongations X3/week, laser X3/ week); week 6 and 8 (Tecar X3/week, kinesiotherapy daily, elongations X2/week, laser X2/ week)
- week 9 and 11 (Tecar X3/week, kinesiotherapy daily, elongations X2/week, laser X3/week), week 10 and 12 (Tecar x5/week, kinesiotherapy daily, elongations 1/week, laser X1/week); week 13 and 14 Tecar X3/week, kinesiotherapy daily, elongations X3/week, laser X3/week.

#### **Results**

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**Table 1. Centralisation of initial phase and final phase**

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**Males (n = 5)**

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Initial variables		Final variables
Age	32 ± 2.54951	
Pelvic tilt	10.4° ± 1.14017°	5° ± 0°
VAS		0 ± 0
Muscular assessment	9 ± 0.7071	0 ± 0
Slump test	4.6 ± 0.54772	Negative
Lasegue test	Positive	Negative

Table 1 features the values of the five male subjects, mean age =32 ani, ±2,54951, with mean initial pelvic tilt = 10°, ±1.14017, final pelvic tilt=5°, initial VAS = 9±0.7071, final VAS = 0, initial muscular assessment =4.6,±0.54772, muscular assessment =0, Slump test (positive=initial, final=negative), Lasegue test (positive=initial, final = negative). The values increased concomitantly with the daily visits to recovery. A real advantage was their age, their capacity of observing the recovery program even at home; all patients were very determined to recover as quickly as possibly (16 weeks).

**Table 2.** Centralisation of Tecar therapy values, initial and final phase

Initial variables	Males (n = 5)	Final variables
Mod	500 kHz	500 kHz 64 Vrms ± 2
Emission	56 Vrms±2.40831	
Frequency	27.513 Jtot ± 1.867	34.584 Jtot ± 1.035

Table 2 features the values determined for each subject individually, the values increasing until the end of the recovery period. Initially, the mean value was 56 Vrms ±2.40831, 500 kHz, energy transfer 27.513 Jtot ± 1.867, power – Bipolar, continuous, resistive mode, 20 minutes for phase I and 20 minutes for phase II in ventral decubitus, while for the final phase of the treatment, a mean value of 500 kHz, 64 Vrms±2 was determined, energy transfer 34.584 Jtot ± 1.035, Bipolar, continuous, resistive mode, 20 minutes for phase I and 20 minutes for phase II, (patient placed in ventral decubitus).

**Table 3.** Centralisation of the laser therapy values, initial and final phase

Initial variables	Males (n = 5)	Final variables
Age	32 ± 2.54951	
Diagnosis: Acute low back pain	14.7 J/cm <sup>2</sup>	20.9 J/cm <sup>2</sup>

Table 3 features the data of the five subjects for laser therapy, with mean age=32, and a diagnosis of low back pain, initial values = 14.7J/cm<sup>2</sup>, final values= 20.9 J/cm<sup>2</sup>, 10-minute session duration, (patient placed in ventral decubitus).

**Table 4. The values of One Sample Test for initial and final pelvic tilt**

Initial variables	Males (n = 5)
Age	32 ± 2.54951 df= 4
t =20.396	Sig. (2- tailed) =.000
95% confidence interval of the Difference	Mean difference=10.400
Lower 8.98	
Upper 11.82	

Table 4 analysed the values of the five male subjects diagnosed with low back pain; the One-Sample Test resulted in the following indicators:

#### Discussion

The study conducted by Wheeler in 2019 has shown that low back pain is a fact of life. Almost everyone suffers from it sooner or later. One of the main causes of acute or chronic back pain is low back marrow. It may also be caused by emotional stress, faulty posture, overweight, and maintaining the same position for long intervals. The recovery time depends on the impairment degree of the lumbar spine. Easy cases may be healed in a matter of days, while for severe traumas, several months may be necessary. Once the back pain is gone, the physician is likely to recommend a rigorous program of recovery, exercises, and modern therapies applied. This will make the back muscles stronger and smoother, and the recovery easier.

The recovery process and the therapeutic conduct indicated by the specialist physician /kinesiotherapist plays a very important role, and this aspect cannot be neglected. If recovery starts right after the trauma, the chances of recovery are 100%, while the risk of a long-term motor deficit is minimum, next to zero. A very good collaboration is necessary between the athletes and the GP/specialist physician for an ultimate advantage of the athlete. The patient can truly become the unique beneficiary only by observing strictly the indications from specialists.

#### Conclusions

Given its advantages, the Tecar therapy, the low back elongation, the high-power laser therapy –

t=20.396, df=4, p<0.001. Data show that the recovery protocol and program applied to the subjects had a significant impact on their performance

accompanied by kinesiotherapy – used in this combination are essential for a speedier recovery of acute low back pain occurring post-traumatically.

Recovery programs have higher results if they are applied after the modern therapies, and the time allocated to sports activity return is thus shortened. Physical therapy programs consolidate the muscle groups supporting the low back muscles, improve mobility and flexibility, promote correct posture, and they are often used in combination with other interventions, for a favourable result. An important component of any exercising program is kinesiotherapy, with a biomechanical approach to the treatment of back pain. Most therapeutic programs of recovery are designed to treat low back pain.

We have attained the purpose of this study, and the objectives can be presented regardless of a patient's treatment phase: the patients had 100% recovery; the inflammation reduced; the low back stiffness disappeared, just like pain during mobilisation (Table 1), the muscle tone along the lumbar spine returned (Table 1), joint mobility improved, range of motion increased significantly from the moment of the first visit to the specialist's practice/the recovery practice. The subjects bounced back quickly: 16 weeks from the onset of the first sign of injury, they resumed the sports activity practiced before the trauma.

Acute back pain resulting from body mechanics – sometimes inadequate – may often be prevented by avoiding movement generating pain or

destroying the spine, by maintaining a correct posture and by lifting and carrying objects accordingly.

The essential aspect is to determine very clearly the underlying cause of back pain; hence, the treatment can target this underlying cause specifically. Most types of acute back pain improve after a few weeks of treatment. Rest, painkillers, local heat may mitigate the traumatism. Total bedrest is not recommended and a limitation of movements is not indicated, either. It is useful to continue the activity; light exercising is also beneficial, while daily sports activity should be reprised gradually.

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