

## ORIGINAL ARTICLE

### Effectiveness of diathermy in patients with low back and pelvic pain referred to lower limb: A pilot study

### Eficacia de la diatermia en pacientes con dolor lumbar y pélvico referido al miembro inferior: Un estudio piloto

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## Abstract

**Objectives:** Low Back and pelvic pain is a major problem and a common cause of disability and health care utilization. To evaluate diathermy efficacy for low back and pelvic pain treatment.

**Methods:** Reports of 20 multifidus in subjects with a previous low back and pelvic pain diagnosis. A randomized trial blinded with two randomized groups, group A diathermy, group B sham diathermy to check efficacy of diathermy.

**Results:** Diathermy group don't show significant differences versus sham group due to be apply as an isolated technique but this technique rarely is reported in this way and is frequently associated to perturbational training or a kinesiotherapy program during his activation. A better correlation was achieved by diathermy in Tensomyography values.

**Conclusions:** Further studies are necessary to improve knowledge about physical effects of diathermy due to this technique is frequently associated with a kinesiotherapy program to get better results in patients with prevalent illness as lumbar and pelvic pain referred to lower limb.

**Key Words:** Low back pain, pelvic pain, diathermy

## Resumen

**Objetivos:** El dolor lumbar y pélvico son problemas de salud prevalentes y la mayor causa de discapacidad y de gasto sanitario. Evaluar la efectividad de la diatermia para el dolor lumbopélvico.

**Método:** Se seleccionan 20 multifidus en sujetos con dolor lumbopélvico previo. Se desarrolla un estudio ciego con dos grupos aleatorizados, grupo A diatermia, grupo B diatermia placebo para comprobar la eficacia.

**Resultados:** El grupo tratado con diatermia no mostró diferencias significativas con el grupo placebo de manera aislada. Esta técnica rara vez se usa de manera aislada y se asocia frecuentemente a técnicas de propiocepción o a fisioterapia. El grupo de diatermia mostró mejores valores en las correlaciones tensomiográficas.

**Conclusiones:** Se necesitan más estudios para incrementar el conocimiento de los efectos físicos de la diatermia en poblaciones con enfermedades prevalente como la lumbalgia

**Palabras Clave:** Dolor lumbar, Dolor pélvico, diatermia.

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## Introduction

Back pain is defined as a neck, thoracic, and lower-back spinal pain. In the majority of cases is considered as “nonspecific back pain” with unknown etiology. Therefore, some pathology as radiculopathy or discogenic disease develops back pain and is considered “specific pain” with known etiology.

Although back pain is usually self-limited and resolves within a few weeks, approximately 10% of the subjects develop chronic pain that impose large charge to the health-care system, temporarily off work, and decrease productivity (1). In a recent study, direct cost of back pain were US\$ 91 billion or US\$ 46 per capita related to physician services, medical devices, medications, hospital services, and diagnostic tests (2). Indirect costs were estimated between US\$ 7 billion and US\$ 20 billion per capita related to employment and between US\$25 and US\$ 71 per capita related to household activities (3-5). A study published in 2007 showed that the 3-month prevalence of back and/or neck pain in USA was 31% (low-back pain: 34 million, neck pain: nine million, both back and neck pain: 19 million) (6). Low back and pelvic pain referred and not referred to lower limb is a prevalent condition in podiatry assistance.

Diathermy term was defined by Dr. Carl Franz Nagekschmidt (1975-1952). Diathermy is a high frequency electrical stimulus most frequently used in chronic pain clinical management.

Ultrasonography imaging studies and tensiomyography had been widely used to check muscle condition. In subjects with low back pain it has been proved morphological-functional changes in soft tissues cross sectional area. (7-11)

Pillastrini et al, Kiesel et al, Whittaker et al. and Teyhen et al. reports about reliability of dynamic and static ultrasonography to check muscle activity. (12-15)

Increase connective muscular tissue were shown in patients with chronic low back and pelvic pain, and in a dynamic ultrasonography study a contraction show deficit of transversus and multifidus L5-S1 16. Some authors, show a strong relationship between tensiomyography and clinical condition. (17-18)

Algometer and Pain Analogic scale show a high reliability inter e intrarater to check pain in subjects with a previous diagnosis of low back pain. Also orthopedic test as Schober’s test were deeply applied to check functionality.(19,20)

Actually there are no evidence about relationships between thickness and cross sectional area with diathermy therapy intervention. The aim of the trial was to test the efficacy of diathermy at low back pain and correlations between measurements in soft tissues with tensiomyography and functional test.

## Materials and Methods

Single-center, randomized, single-blinded, controlled clinical trial. The Clinical Research Ethics Committee Hospital Universitario “La Princesa” (10/2013) approved the study and was registered at Clinicaltrials.gov (NCT02032602). Research trial was developed from April 2016 to December 2016.

## Subjects

A pilot study was carried with a simple size of 20 multifidus bilateral for subjects, that accept participate in the trial. We randomized our participants with non specific low back pain. 10 multifidus was intervened by a treatment group with capacitive diathermy combined with manual therapy instrumental. (group T-CaRe® n=10) . The rest of subjects received the same protocol intervention while diathermy was power off ( n = 10). Subjects are recruited from Faculty of health Sciences in Universidad Europea de Madrid.

### *Inclusion criteria*

Pelvic-Low back pain bilateral over 6 weeks, age 18-60. Informed Consent was signed for all participants.

### *Exclusion criteria*

Positive leg rise straight test, previous neuromuscular pelvic-low back disorders from clinical record, respiratory disease, previous surgical procedures and body mass index over 30, history of previous congenital or dermatologic pathology, pregnant, self reported high physical activity, Nijmegen test over 24 points. Subjects with simultaneous treatment (physical therapy or drugs), also we exclude properly exclusion criteria from diathermy interventions.

Subjects were randomized by protocol with a randomized paper generator. 10 multifidus muscles was treated with manual therapy instrumental and diathermy power on meanwhile the rest of the subjects get the same intervention with diathermy power off.

### **Methods**

A high quality ultrasound system (LOGIQ P9; General Electric GE Healthcare, 510332; PRIM®; Móstoles, Madrid 28938, Spain) with a range frequency from 6-15.0 MHz range linear transducer was used to check muscle status. PPT was measured from 0 to 10 kg/cm<sup>2</sup> with a manual-mechanical algometer (FDK/FDN, Wagner Instruments, 1217 Greenwich, CT 06836). Diathermy was achieved by a diathermy generator (TCare® power (Easytech back to motion) by PRIM® ; Mostoles , Madrid 28938, Spain)

### **Intervention**

Complete initial evaluation of the subjects were developed with echography, tensiomyography and pain check analysis. After that, all subjects were treated (10 power on, 10 power off). At the end, the same clinical evaluation with echography, tensiomyography, and pain check analysis were developed. We repeated this procedures during four weeks, with only single intervention for week.

### **Statistical analysis**

SPSS version 22.0 for Windows (IBM Corp. Released 2013. Armonk, NY: IBM Corp) was used for statistical analysis. A Shapiro-Wilk test was used to test normality taking into account all of the participants together, and each group independently assessed. A descriptive analysis was selected to summarize the outcomes in the measurements that were carried out and included the mean, SD, median, interquartile range, quartiles, asymmetry, and kurtosis. To test our trial hypothesis for parametric test we developed t-student test and for non-parametric U-Mann Whitney. Correlations measures were carried out with Pearson's and Spearman's test. We show an interval of confidence of 95% .

### **Results**

The descriptive data of the sample characteristics are a  $28,8 \pm 8,2$  years old, a height with values of  $171 \pm 11$  cm and weight of  $70,3 \text{ kg} \pm 14,2$  Kg. The groups did not differ in sex, age, height, weight, BMI ( $p \geq 0.05$ ). At the main result variable we check, 1) Pain modification was result through difference between final value and initial value.

The power-on group shows a difference of  $-2.1 \pm 2,1$  (higher than clinical minimum detectable change), the power-off shows a lower difference of  $0,84 \pm 0,7$ . 2) Owestry's test measure get a value of  $1 \pm 5,4$  for power-on group and  $1,2 \pm 3,4$ . 3) Schober's test gets a value of  $-0,6 \pm 1,3$  for power-on group and  $0,8 \pm 1,8$  for power off. PPT at right side values were  $-0,2 \pm 1,3$  and  $1,2 \pm 1,9$  and PPT at left side were  $-0,1 \pm 1,3$  and  $1,3 \pm 1,4$  respectively for power on and power of measures.

On one hand, non-statistically significant differences were observed between the groups ( $P < 0.05$ ) for the main variables in every time along the study. We tested differences pre-post treatment, and also along the four weeks until complete the trial. On the other hand, the power-on group shows a better correlation with Schober's test values and Tensomigraphy than the power off group with a strong in active diathermy group in variables TR and TS (0,65).

	Group	Mean	SD	Standar error
Pain Modification	Diathermy	-2,02	2,15	,96
	Sham Diathermy	-,84	,72	,32
Oswestry	Diathermy	1,0	5,39	2,41
	Sham Diathermy	-1,24	3,49	1,56
Schöber's test	Diathermy	-,6	1,38	,62
	Sham Diathermy	,86	1,89	,84
Right Pain pressure threshold	Diathermy	-,23	1,35	,6
	Sham Diathermy	1,28	1,94	,86
Left Pain pressure threshold	Diathermy	-,13	1,37	,61
	Sham Diathermy	1,35	1,48	,66

**Table 1. Descriptive values for Main Variables a) Pain Modification b) Oswestry c) Schober's test d) Pain threshold D e) Pain threshold I**

## Discussion

Patients with low back and pelvic pain referred to lower limb can be treated in different modalities. Active therapeutic exercise and psychological interventions are the most effective technique to handle the evolution of these patients (7,10).

In our trial diathermy didn't found differences versus sham diathermy. This is a strong limitation due to diathermy rarely is used as a single technique. On the other hand, is deeply proved that manual physical therapy techniques are improve their clinical effectivity when are simultaneously applied with other physical techniques.

A deeply knowledge about TMG information is necessary to achieve a better knowledge about clinical interrater muscle modifications (18).

Diathermy is a widely physical therapy technique in low back, pelvic and neck pain. Frequently this clinic intervention is added to an active therapeutic exercise leaded by a physical therapist.

Furthermore, scientific evidence lead us to improve the clinical effects of diathermy with a kinesiotherapy program or a perturbation training during the application and after that a program of therapeutic exercise leaded by a physical therapist (11).

This clinical activity must be added to other clinicians specialist as psychologist and primary care clinicians.

## Conclusions

Not significate differences were shown between diathermy and sham. Diathermy technique application is not usually applies as an isolated process. Rarely is reported in this way and is frequently associated to perturbation training or a kinesiotherapy program during its activation. Diathermy Group shows a better correlation measures than sham about functional muscle characteristics as Schober's test and TMG measures.

Further studies are necessary to improve knowledge about physical effects of diathermy due to this technique is frequently associated with a kinesiotherapy program to get better results in patients with prevalent illness as lumbar and pelvic pain irradiated to lower limb.

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