



RESEARCH ARTICLE

EFFECT OF INTERFERENTIAL CURRENT ON PAIN AND FUNCTION OF CHRONIC LOW BACK PAIN

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ABSTRACT

The aim of the current study is to study the effect of interferential current on pain and function of chronic low back pain patients. Research methodology: Twenty patients complaining from chronic low back pain lasting more than 3 months was randomly assigned into 2 equal groups. Experimental group which received interferential current in addition to medical treatment and control group which received only medical treatment. The main outcome measures of the current study was present pain intensity (PPI) measured by McGill Pain Questionnaire and function measured by Roland-Morris Disability Questionnaire. The current study showed that there was a significant difference between control group and interferential group regarding present pain intensity and disability index. Conclusion and recommendations: We conclude that the addition of interferential current to medical treatment in the management of chronic low back pain is essential and effective.

Key words: Interferential Current – Chronic Low Back Pain.

INTRODUCTION

Low back pain is one of the most frequent problems treated by physical therapists worldwide (Goats 1990). Chronic low back pain (CLBP) is a significant public health problem due to its high prevalence and associated socioeconomic cost (Van der Roer, *et al.*, 2004). CLBP is defined as the presence of low back pain for > 12 weeks (Quittan 2002). The prevalence of CLBP ranges from 20%-40% in developed countries and from 30%-85% worldwide. CLBP is more common between 35 and 64 years of age. Unless treated, CLBP may lead to significant disability in performing activities of daily living (ADL). The relationship between symptoms and the level of disability in performing ADL might be quite complicated. Social and psychological factors are known to be important in the development of CLBP and in the process of becoming a chronic problem. Prolongation of the painful period also has a significant negative impact on the daily functions of the patient (Udén *et al.*, 1988). There are various electric stimulation devices that can deliver electric currents to treat painful conditions within the physiotherapy profession. successful management of musculoskeletal pain is a major challenge in clinical practice. One of the electrotherapeutic techniques used for managing musculoskeletal pain is interferential current therapy (IFC) (Fuentes *et al.*, 2010). Interferential current (IFC) is one of the available modalities that are often used in modulating pain in patients with low back pain and other pains originated from musculoskeletal

origin. Surveys have shown that IFC is used throughout the world and it is reported to be indicated in providing symptomatic relief of pain (Johnson and Tabasam 2003). Interferential current therapy is the application of alternating medium frequency current (4,000 Hz) amplitude modulated at low frequency (0–250 Hz) (Palmer and Martin 2002).

A claimed advantage of IFC over low-frequency currents is its capacity to diminish the impedance offered by the skin. Another advantage speculated for IFC is its ability to generate an amplitude modulated frequency (AMF) parameter, which is a low-frequency current generated deep within the treatment area. Several theoretical physiological mechanisms such as the “gate control” theory (Melzack and Wall 1965), increased circulation, descending pain suppression, block of nerve conduction, and placebo have been proposed in the literature to support the analgesic effects of IFC (De Domenico 1982). Despite IFC’s widespread use, information about it is limited. A review of the literature reveals incomplete and controversial documentation regarding the scientific support of IFC in the management of musculoskeletal pain (Fuentes *et al.*, 2010). The objective of the current study is to determine the effect of interferential current in the management of low back pain and improving function and decreasing the analgesic requirements of patient.

MATERIAL AND METHODS

Twenty patients with CLBP lasting for at least 3 months were included in the study. Patient age (years), body mass

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index (BMI; kg/m²), occupation, and duration of symptoms were recorded. All patients were examined thoroughly by the same physicians; routine laboratory test results as well as radiographs were evaluated. Patients were excluded from the study for the following reasons: evidence for acute radiculopathy; the presence of an inflammatory disease, neoplastic disease, spondylolysis, spondylolisthesis or sacroiliitis; lumbar disc herniation requiring surgical treatment; vertebral fractures; pregnancy. The study was approved by the local Ethics Committee and written informed consent was obtained from all patients. The consecutive patients were randomly allocated into two groups. This was a single-blind study. Patients were treated 5 days a week for 3 weeks. Group 1 patients received hot packs (15 minutes), IF, and exercise, and group 2 patients received hot packs (15 minutes), and exercise.

Interferential treatment

In group 1, The IF current was fixed at 100 Hz and the sweep between 50 and 100 Hz. The range of frequencies was based on the recommendation of Palmer and Martin (Palmer and Martin 2002). Carrier frequencies were fixed at 4000 Hz in the channel while channel 2 is set to fluctuate between 4050 and 4100 Hz. was applied to the lumbar para-vertebral region.

Therapeutic exercise

Both groups performed range of motion, stretching (hamstring, pelvic, and abdominal muscles) and strengthening (cervical, thoracic, and lumbar region muscles) exercises for 15 minutes.

Clinical Assessment

After selection through consultation with a doctor, the patients provided their written consent and were given an opportunity to ask any questions regarding the procedure. The patients were examined by an independent physiotherapist, who used a pre-prepared card composed of several instruments: Present pain intensity (PPI) of Brazilian version of the McGill Pain Questionnaire (Melzack 1987), and Roland-Morris Disability Questionnaire (RMDQ) (Nusbaum 2001). The examination was done by an independent physiotherapist before and after the protocol of ten treatment sessions. This examiner did not follow the treatment and did not know which group the patients had been included in. After each treatment session, After evaluation by the physiotherapist, the patients were randomized, through numbers created by a computer, into 2 groups: 1) interferential current (n = 10); 2) controls (n = 10). The randomized design was balanced in groups of 10. A set of sealed, sequentially numbered opaque envelopes was used for study group assignment. Thus, the study was single-blinded, i.e. the examiner had no contact with the patient during the treatment, and the patient was instructed not to report what assistance had been received during the sessions.

Intervention: one equipment was used: Endophasys I-ET9702 (interferential current. The treatment was applied over a three-week period, in fifteen sessions. For both groups, the stimulation was administered for 30 minutes, using a strong, but comfortable intensity that was adjusted according to each patient's sensitivity. Four self-adhesive electrodes with dimensions of 5 x 5 cm were placed over the T12 and S1 lines. The IFC was adjusted to a base frequency of 4050 Hz, with a

modulation frequency range of 50 Hz, and slope of 1/1, in quadripolar mode. The patients filled out a questionnaire in which, aided by a physiotherapist, they stated for how long their pain relief after the session had lasted and whether they had used any painkillers or anti-inflammatory drugs prescribed by the doctor, and what dosages they used. After completing 15 sessions, the patients were reassessed by an independent evaluator who used the same instruments. Data analysis: Data were analyzed using a Statistical Package for Social Sciences (SPSS) version 15.0. t- test wither paired or unpaired was used to compare between outcomes of pre and post treatment interventions. Level of significance for all tests was set at 0.05 for all statistical tests.

RESULTS

Population sample of the current study consisted of 20 patients recruited from out-patients physical therapy department at King Abdul Aziz hospital – Taif – KSA, they were randomly divided into 2 groups (each group = 10) there no significant difference between IF group and control group regarding age, weight, height, and body mass index (MMI) as shown in Table 1.

Table 1. patients demographic data

Parameters	IF Group (% ± SD)	Control group (% ±SD)	Significance
Age	49.63 ± 15.52	46.56 ± 15.197	NS
Height	1.61 ± 0.08	1.63 ± 0.08	NS
Weight	69.88 ± 14.93	67.93 ± 12.40	NS
BMI	26.64 ± 5.96	25.50 ± 3.62	NS

The main outcome measures of the current study was present pain intensity (PPI) measured by McGill Pain Questionnaire and function measured by Roland-Morris Disability Questionnaire as described earlier in the material and methods section , the current study showed a significant decrease in present pain intensity (PPI)and function after 4 weeks of IF treatment. on the other hand, there were no significant difference in present pain intensity (PRI)and function after 4 weeks of conventional medical treatment as shown in Table 2.

Table 2. Shows the mean and slandered deviation of interferential group (IF) and control group of PPI and Function

Parameters	IF Group (Mean ± SD)		Control group (Mean ±SD)	
	Pre	post	pre	Post
PPI	5.73±1.90	2.24±1.65	6.54± 1.60	6.15±1.54
Significance	S		NS	
P-value	P<0.001		P>0.05	
Function	14.7± 5.41	5 ±4.71	14.1±5.49	12±5.45
Significance	S		NS	
P-value	P<0.001		P>0.05	

Table 3. Shows comparison between IF group and control group after 4 weeks of either conventional medical treatment and interferential therapy

Parameters	pre		post	
	IF group	Control group	IF group	Control group
PPI	5.73±1.90	6.54± 1.60	2.24±1.65	6.15±1.54
Significance	NS		S	
P-value	P>0.05		P<0.001	
Function	14.7± 5.41	14.1±5.49	5 ±4.71	12±5.45
Significance	NS		S	
P-value	P>0.05		P<0.01	

The current study showed that there was a significant difference between control group and interferential group after 3 weeks of treatment as shown in Table 3.

DISCUSSION

According to the results presented, IFC produced significant effects in relation to pain intensity reduction, and disability improvement. On the other hand, these results did not occur in the control group. According to the result of the current study, there were no significant difference between IFC group and control group regarding the confounding variable of the study such as age, weight, height, and BMI which indicate that the results occurred are due to the intervention of the study i.e interferential current. Some experimental studies showing the analgesic effects of IFC on induced pain have been conducted (Johnson and Tabasam 2003). So far, only a small number have dealt with specific problems such as recurrent jaw pain (Taylor 1987), and pain after knee surgery (Jarit *et al.*, 2003). Studies have recently been conducted on IFC application in cases of acute low back pain (Hurley *et al.*, 2001) and chronic low back pain (Price *et al.*, 1983).

Hurley *et al.* (2001) found significant changes in pain intensity and functional capability. Previously, Hurley *et al.* (2001) had achieved significant improvements in acute low back pain intensity by means of different electrode positions. Although Hurley *et al.* (2001) investigated patients with acute pain, their findings were in agreement with the reductions in pain intensity seen among the patients of the present study, which were also significant findings in their studies. In a randomized clinical trial, Werners *et al.* (1999) applied IFC to cases of chronic low back pain and compared its effect with the effect of massage, among 148 low back pain patients. Both groups underwent six ten-minute sessions, but the selection criterion of how long the patients needed to have had their complaint was not described. There were no significant differences between the groups in relation to the outcomes evaluated. IFC gave rise to a mean pain reduction of 10% immediately after the treatment and 16% after three months. Their findings were in agreement with those of the present study.

Conclusion

The present study concluded that interferential current is essential in the treatment of chronic low back pain lasting more than 3 months.

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