

*Original article*

## Evaluation of the effectiveness of short-term physical therapy program in low back pain patients

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### Abstract

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**Background:** Low back pain is common musculoskeletal problem which is the most common cause of loss of functional activities consequently lead to disability and workforce loss. This problem might happen due to inflammatory diseases or mechanical causes. Pain is the main symptom of low back pain beside stiffness, muscle spasm and sciatica. Beside medical treatment, physiotherapy is effective in treating low back pain.

**Objective:** This study aimed to evaluate the effectiveness of short-term physical therapy program on pain intensity and functional activities in low back pain patients at Zawia Teaching Hospital.

**Methods:** 20 females aged between (20 -70 years) diagnosed with non specific low back pain received physiotherapy treatment at Zawia Teaching Hospital participated in the study. Two questionnaires are used pre and post treatment to evaluate effectiveness physical therapy program on pain intensity and functional activities in low back pain patients.

**Result :** The statistics revealed significant pain relive and increase in the functional ability with P value equal to 0.000 for both visual analogue scale and Tunisian version of Oswestry disability scale pre and post measurements.

**Conclusion:** The study revealed that the short-term physical therapy program is effective in decreasing pain intensity and improving functional activities in low back pain patients.

**Key words:** Low back pain, physiotherapy intervention, pain intensity, functional activity.

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### Introduction

the lumbar area or due to other causes include fractures of vertebra column, inflammatory diseases, lumbar spondylosis, lumbar disc prolapsed<sup>4,1</sup>. However, the majority of LBP patients are labeled as nonspecific cause, because no underlying pathology can be found. Symptoms of LBP include pain, stiffness in the lower back, muscle spasm,

Low back pain (LBP) is considered as one of the most musculoskeletal problems as most people have LBP as some point in their life, but their complain vary in pain intensity and duration. Therefore, it can be classified as acute or sub acute or chronic depending on how long the pain lasts.[1,2,3] LBP occurs due to strain or sprain of muscles or soft tissue in

in LBP patients. The best improvement was achieved by using manual therapy[11]. Electrotherapy like pulsed electromagnetic (PEMT), ultrasound, TENS, DD current, interferential current, laser therapy showed great improvement in the problem of LBP.[12,13,14] A study aimed to evaluate the effectiveness of various forms of physical therapy (peloid therapy, US, and PEMT) on LBP treatment. The researchers found three various forms of physical therapy give analgesic effects, increased patients' physical activity, and decreased their degree of disability.[15] when investigated the efficacy of PEMT on LBP, the researchers found PEMT reduced pain and disability level that appears to be a potentially useful therapeutic tool for the conservative management of LBP.[12] A blinded research conducted to compare the effectiveness of analgesic DD currents and TENS therapies in patients diagnosed with LBP syndrome caused by discopathy. Results of their study showed that both therapy modalities reduce pain level effectively.<sup>13</sup> Another study assessed the efficiency of selected electrotherapy modalities on pain reduction in LBP patients. Significant improvement was seen in all electrotherapy modalities except DD currents which showed the lowest analgesic effect.[14] Thermotherapy specially infra red (IR) is another physical therapy modality can be used in treating LBP and showed it benefits.[16] Although a great deal of researches have been conducted to find the proper treatment plan. However, to the researchers knowledge no study investigated the effectiveness of ongoing treatment plan for this particular group. Therefore, researchers decided to conduct a pilot study with pre and post treatment measures to evaluate the effectiveness of short-term physical therapy program at Zawia Teaching Hospital on pain and functional activities in low back pain patients.

## Methodology

required number of participants for the study where in a medium effect size of 0.80, an alpha

sciatica, and reduced in range of motion during lifting and bending of trunk.<sup>21</sup> LBP is a significant condition that limits the ability of individuals to perform the activities of daily living such as standing, walking dressing, work related activities. As a result LBP is considered as an important cause of morbidity and workforce loss.[5,6]

Passive treatment modalities (for example bed rest, massage, ultrasound, electrotherapy, laser and traction) are not recommended for LBP as mono-therapy, because they increase the risk of illness behavior and chronicity.[7] Therefore, using wide range of treatment modalities such as non steroidal anti inflammatory drugs (NSAIDs), local injections, surgery when it is needed and an array of physical therapy interventions may be required.<sup>8</sup> Different modalities of physical therapy reduce pain and increase functional level in LBP patients. Manual therapy like maitland mobilization and exercise therapy as active isotonic and isometric strengthening, lumbar traction, lumbar stabilization and stretching exercises were studied in several randomized trials (RCT). In a large RCT, researchers found that the combination of physical therapy methods modalities (hot pack, ultrasound (US), and transcutaneous electrical nerve stimulation (TENS)), exercise and medical treatment improved pain and functional status in the long term more than exercise and medical treatment without physical therapy.<sup>9</sup> Another RCT aimed to compare between the effect of manual and exercises therapy on patient with LBP. The researchers found significant improvement in pain and functional status, the improvement was reflected on all measurements immediately after the 2-month treatment.<sup>10</sup> Furthermore, a study conducted to investigate the effectiveness of manual therapy in comparison with conventional physiotherapy

A pre calculation was conducted using Cohen's tables in order to calculate the

Data collected in the first session of the program as the demographic data of the patients were collected first and then were given two questionnaires; visual analog scale (VAS) to identify the level of pain intensity. Tunisian version of Oswestry disability scale (TODI ) used to evaluate the effect of low back pain on functional daily activity.[18] These measures were repeated at the end of the last session of the treatment program.

**Interventions**

week, each session included; Infra Red therapy(IR) 20 min, diadynamic current (DD) 15 min, electromagnetic therapy (EMT) 15 min, exercise therapy 30 min.

level of 0.05 was set.[17] A sample of 20 subjects was calculated as sufficient to evaluate the effectiveness of short-term physical therapy program on pain and functional daily activities for LBP patients. The convenient sample of LBP patients aged between 20 -70 years were recruited from the outpatient physiotherapy department of the Zawia Teaching Hospital. The nature of the study and assessment procedure were explained to each subjects. All subjects signed consent form before their participation.

A blinded therapist evaluated the patients and prepared the treatment plan as an ordinary procedure in the outpatient department of physiotherapy as well as to reduce bias in the study. Patients then assigned into a four weeks physical therapy program three sessions a

**Results**

*Table1: participant's Demographic Data*

	Minimum	Maximum	Mean	SD
<b>Age/yrs</b>	26	70	49.2	26.9
<b>Weight/kg</b>	60	130	79.3	17.6
<b>Height/cm</b>	145	170	160.9	8.4

Keys: min= minimum, max= maximum, SD= standard deviation, yrs= years, kg= kilogram, cm= centimeter

kg with standard deviation 17.6kg. the subjects height ranged between 145 cm to 170 cm their mean is 160.9 cm with 8.4 cm of standard deviation (table 1).

The study included 20 females diagnosed with non specific low back pain aged between 26 years to 70 years with mean 49.2 years and standard deviation 26.9 years. Their weight varied from 60 Kg to 130 Kg with mean of 79.3

*Table2: descriptive data for each outcome pre and post therapy*

		Mean	Std. deviation
<b>Pair 1</b>	VAS/pre	7.30	1.750
	VAS/post	3.70	1.559
<b>Pair 2</b>	TODI/pre	20.35	7.043
	TODI/post	10.35	4.902

Keys: pre= pre therapy, post= post therapy, N= number Std. Deviation= Standard Deviation

deviation of 7.043 this can be converted to 51% which means these patients are severely disable based on Fairbank & Pynsent.<sup>18</sup> the post therapy on the other hand the mean was 10.35 and 4.902 standard deviation this also can be converted into a percentage of level of disability 26%, this can be translated as the subjects after therapy have moderate disability.

Table 2 present the descriptive data for each outcome measure pre and post therapy. The first outcome represents pain using VAS, in the pre therapy results the mean value was 7.30 with relatively small standard deviation of 1.750, in the post therapy the mean was 3.70 and only 1.559 standard deviation.

The second outcome represents the functional disability using TODI. In the pre therapy results the mean value was 20.35 and standard

**Table 3: results of t-test to compare the pre and post therapy of VAS and TODI data**

		Mean	Std. deviation	t- value	Level of significant
<b>Pair 1</b>	VAS/ pre - post	3.600	1.667	9.658	0.000
<b>Pair 2</b>	TODI/ pre- post	10.000	5.974	7.486	0.000

Keys: pre= pretherapy, post= posttherapy, N= number Std. Deviation= Standard Deviation

as 0.000 is  $P > 0.005$ . a similar level of significant obtained in the TODI ( $P = 0.000$ ) the mean value of the comparison between pre and post therapy TODI result was 10.000 with 5.974 standard deviation.

Table 3 shows the results of t-test to compare the results of pre and post treatment for VAS and TODI. The comparison of VAS before and after therapy was calculated via t- test which showed a mean value of 3.600 and standard deviation of 1.667 this value is high significant

## Discussion

applied to the included patients divided into 20 minutes of IR radiation , 15 minutes of electromagnetic therapy, DD current for 15 minutes and about half an hour of therapeutic exercises such as strengthening and stretching for lower back muscles. The program is applied for only one month three sessions per week. The descriptive data for each outcome pre and post therapy showed the mean value of VAS pre therapy was 7.30 with relatively small standard deviation of 1.750, in the post therapy the mean was 3.70 and only 1.559 standard deviation . Tunisian Arabic version of TODI in the pre therapy results the mean

The current study investigating the effectiveness of short-term physical therapy program on pain intensity and functional activities in low back pain patients at Zawia Teaching Hospital. Twenty LBP patients participated their ages ranges between ( 20 - 70 years ) with large variation (26.9 yrs), their weight measure showed relatively large variation (17.6 kg) as the lowest weight recorded was 60 kg whereas the heaviest was 130 kg. Despite the large variation in the first two measurement the patients' height was very close as the standard deviation was only 8.4 cm. The physical therapy program which

study did not specify the types of exercise therapy, the two studies concluded that the exercise therapy has great effective on pain reduction and functional level improvement of LBP patients. All of these studies evaluated the effect of therapeutic exercises on LBP patients, their results showed good effect of exercises in reducing pain and increasing functional activities . This means that their results are consistent with the results of our study in terms of the effect of exercise on patients with LBP . in the placebo study by Lee et al<sup>12</sup> it is found PEMT reduced pain and disability and appears to be a potentially useful therapeutic tool for the conservative management of chronic lower back pain. This study and current study approved using pulsed electromagnetic therapy reduces pain and disability in LBP patients In this pilot study the pulsed electromagnetic therapy is included in short-term physical therapy program at Zawia Teaching Hospital. Results of two studies demonstrate using electromagnetic therapy reduce pain and improve functional status of patients with LBP .

The blinded research by Ratajczak et al<sup>13</sup> showed both DD and TENS reduce pain level effectively. Similar to our study as we found significant improvement when the di-dynamic current is included in the program. Similarly, Rajfur et al<sup>14</sup> observed significant improvement with using conventional TENS ,TENS, high-voltage electrical stimulation, interferential current stimulation on pain reduction and functional improvement except DD currents which showed the lowest analgesic effect. Result of this study conflict with current study because we found significant reducing in pain when including DD as a part of the physical therapy program.

Thermotherapy specially infrared is another physical therapy modality can be used in treating LBP . after a six-week IR, Ojeniweh et al<sup>16</sup> in their Nigerian experimental study, researchers found significant reduction in pain intensity and functional disability in both the experimental and control groups. Results of

value was 20.35 and standard deviation of 7.043 this can be converted to 51% which means these patients are severely disable based on Fairbank & Pynsent interpretation.<sup>18</sup> Post therapy the mean was 10.35 and 4.902 standard deviation this also can be converted into a percentage of level of disability 26% which means the subjects after therapy have moderate disability.

The pre and post intervention measurements for VAS and TODI was statistically analyzed using pair t-test which showed level of significant obtained in the VAS pre and post measures highly significant as  $P=0.000$  which is less than  $P >0.005$ . Similar level of significant obtained in the TODI ( $P= 0.000$ ) which means that patients have good improvement after receiving such a multi modalities of physiotherapy in each session regarding pain complaint and level of disability.

Many studies have approved the effect of different type of physical therapy (therapeutic exercise , manual therapy , thermotherapy , electrotherapy ) in reduce pain and functional disability in patients with low back pain ; questionnaire like VAS and TODI and other measurements used to evaluate the effect of physical therapy pre and post treatment . Despite the different physiotherapy modalities used in this RCT by Sahin et al<sup>9</sup> compared to the current, the two studies approved using several types of physiotherapy improve the pain intensity and functional ability of the LBP patients. Aure et al<sup>10</sup> found significant improvement in pain and functional status , the larger improvement found with the manual therapy. Although, the manual therapy is not used in the current study, the two studies confirmed applying exercise therapy reduces pain intensity and improve functional level of the LBP patients. Sharma and colleagues found significant improvement in pain intensity and functional level with both methods, the best improvement was achieved by using maitland mobilization. This improvement appeared on prospective repeated-measures design at one month of treatment.<sup>11</sup> Despite the fact that the current

For future studies larger sample of both gender should be considered which suffering from low back pain . In addition to follow-up patients for a longer period and measuring the severity of pain and functional level ; for example at one month , three month , six month , one year after end physical therapy program , this to see the effect of treatment over a long term . The treatment plan can also be replaced to determine the effect of other types of physical therapy on pain intensity and functional level of patients with low back pain .

### Conclusion

thermotherapy, electrotherapy in addition to therapeutic exercises. Such a multiple program is found very effective in reduce pain and increase functional activities in LBP patients.

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this study compatible with the significant result of current study in including IR radiation in the treatment program.

There are several limitations to consider in this study . First, the sample size was relatively small to generalize the results on LBP patients . Second , participants in this study were only female as it was difficult to take a sample of men due to social restrictions. Furthermore, measurement of pain severity and functional disability was only in the first and last session of physiotherapy program , making it difficult to identify long-term effect .

The current study demonstrate the short term physical therapy program at Zawia Teaching Hospital which applied for low back pain patients. The program includes

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