

# The Relative Efficacy Of A Six-Week Tripartite Physiotherapeutic Modality In The Management Of Chronic Low Back Pain

OgundiranOpeyemiOlufemi, OgunsanyaGboladeIsaac

Obafemi Awolowo University Teaching Hospitals Complex, Physiotherapy Department, Wesley Guild Hospital, Ilesha, Osun State, Nigeria,  
+2348052179148

[femi\\_diran@yahoo.com](mailto:femi_diran@yahoo.com)

Obafemi Awolowo University Teaching Hospitals Complex, Physiotherapy Department, Wesley Guild Hospital, Ilesha, Osun State,  
Nigeria,+2347039121112

[gbolade\\_osanya@yahoo.com](mailto:gbolade_osanya@yahoo.com)

**Abstract:** The objective of this study was to determine the efficacy of a six-week tripartite Physiotherapeutic modality in the management of non-specific chronic low back pain with the pain numerical rating scale serving as the principal outcome measure. A major research question was raised with a corresponding null hypothesis formulated for it and tested at 0.05 level of significance. A Quasi-experimental design involving one group pretest-posttest design was selected for the study with ten (10) participants purposively recruited with strict adherence to clearly defined inclusion and exclusion criteria. The participants were managed with a ternary management technique involving fifteen minutes of Infrared Radiation (IR), twenty minutes of Transcutaneous Electrical Nerve Stimulation (TENS) and ten minutes of Soft Tissue Massage (STM) to the low back region. Each participant was managed thrice a week for a duration of six weeks and the data collected were analyzed using descriptive statistics to answer the raised research question while Wilcoxon Signed-Rank test was used to test the hypothesis. The results of this study showed that there was a significant reduction in the pain experienced by the participants. Hence, it was concluded that the Physiotherapeutic intervention was effective in the management of chronic low back pain judging by the overall decrease in the pain intensity.

**Keywords:** Activities of daily living, Non-specific chronic low back pain, Pain numerical rating scale, Physiotherapeutic modality

## 1. Introduction

Low back pain (LBP) refers to pain and discomfort localized below the costal margin and above the inferior gluteal folds, with or without leg pain[1]. It is a common problem that most people experience at some point in their lives[2] which results in considerable direct and indirect costs[3]. When LBP persists for three months or more, it becomes chronic and this can be disabling. The prevalence of chronic low back pain (CLBP) increases linearly from the third decade of life on, until the 60 years of age, being prevalent in women [4]. Chronic low back pain (CLBP) could be disabling, thereby impacting the lives of individuals negatively. For instance, majority of those with CLBP show symptoms of depression or anxiety [5-6]. Previous clinical guidelines generally portray CLBP as having a poor prognosis [7] and this is based either on studies of potentially unrepresentative survival cohorts[8] or on researches with high attrition [9]. However, a study found out that the prognosis is moderately optimistic for patients with CLBP[10]. No preventive measure has sufficient power to completely prevent non-specific CLBP, therefore, we are left with managing the problem when it arises and this can be done with an array of approaches[11]. Generally speaking, CLBP management techniques can be grouped in terms of their invasiveness which include: non-invasive, non-drug pain management (Physiotherapy), non-invasive, pharmacologic pain management and invasive pain management (surgery/injection) [12]. Clearly, Surgery primarily focuses on the alteration of structures perceived to be the sources of pain while conservative management aims to improve patients' function with or without simultaneous improvement of pain [13]. A large number of high-quality studies have shown that educating people with pain more about the

neuroscience of their pain yields some impressive immediate and long-term changes such as: pain reduction, improved function, diminished fear, positive pain perception, improved movement and less money spent on medical tests / treatment [14]. It should however be noted that the lack of an efficient and universal treatment regimen remains a problem in the management of CLBP. Therefore, this study which involved the combination of treatment modalities was embarked upon with the hope that if outcome was favourable, could act as a treatment plan for non-specific CLBP. This would go a long way to ameliorate the plight of its sufferers

## 2. Methods

A Quasi-experimental design involving one group pretest-posttest design was used in the study with each participant serving as his/her own control. The inclusion criteria for this study were thus: participant must be an adult, he or she must be willing to comply with the treatment management techniques and must have had LBP for at least three months. Individuals with tumours, acute inflammatory disease of the spine, severe cardiovascular or metabolic diseases, uncontrolled vital signs such as: blood pressure, pulse rate and respiratory rate, metallic implant/pace-maker, acute osteoporosis, acute systemic infection and pregnant were excluded from the investigation. Ten participants (four males and six females) with CLBP referred from the Orthopaedics and Traumatology unit of University of Benin Teaching Hospital, Benin City, Edo State, Nigeria to the Physiotherapy Department of the same establishment were purposively recruited for the study and informed consent forms were duly completed by the participants. Ethical clearance was obtained from the Hospital's ethics and research committee.

Each participant was managed with a three-fold management technique involving fifteen minutes of Infrared Radiation (IR). The BELA Infrared Light Radiator was kept at a distance of 50-70 centimetres from the skin surface to prevent burns. This was followed by the application of Transcutaneous Electrical Nerve Stimulation (TENS) for twenty minutes. The TENS device (TENS 3000, 3-MODE with Timer TENS unit) has four self-adhesive electrodes which were placed on/around the painful area at the low back region. The current intensity (strength) of the TENS which ranges from 0-80mA at both terminals was gradually increased up to the tolerance level of each participant. Both the stimulation frequency (pulse rate) and pulse width were set at 100Hz and 200ms respectively with the burst mode continually used for all participants. Each treatment session was rounded off with ten minutes of kneading massage to the low back region and all the participants were managed thrice a week for six weeks duration. The pain intensities of all the CLBP sufferers' were measured on a weekly basis using the pain numerical rating scale (PNRS) which is a one-dimensional measure of pain intensity in adults [15]. The PNRS is a segmented numeric version of the visual analogue scale (VAS) in which a respondent selects a whole number (0 – 10 integer) that best reflects the intensity of their pain [16].

### 3. Results

The results are presented in Tables A-B and Fig. A

**Table A:** Weekly progression of pain numerical rating score (pain intensity) of individual sufferers

Participants	1 <sup>ST</sup> wk	2 <sup>ND</sup> wk	3 <sup>RD</sup> wk	4 <sup>TH</sup> wk	5 <sup>TH</sup> wk	6 <sup>TH</sup> wk
A	6.0	5.0	4.0	3.0	3.0	3.0
B	4.0	4.0	3.0	3.0	3.0	2.0
C	6.0	5.0	5.0	4.0	5.0	5.0
D	7.0	7.0	5.0	4.0	4.0	3.0
E	6.0	6.0	6.0	5.0	4.0	4.0
F	3.0	3.0	2.0	2.0	2.0	2.0
G	7.0	6.0	5.0	4.0	4.0	2.0
H	6.0	5.0	4.0	3.0	2.0	2.0
I	5.0	4.0	4.0	3.0	2.0	2.0
J	2.0	2.0	2.0	2.0	1.0	1.0

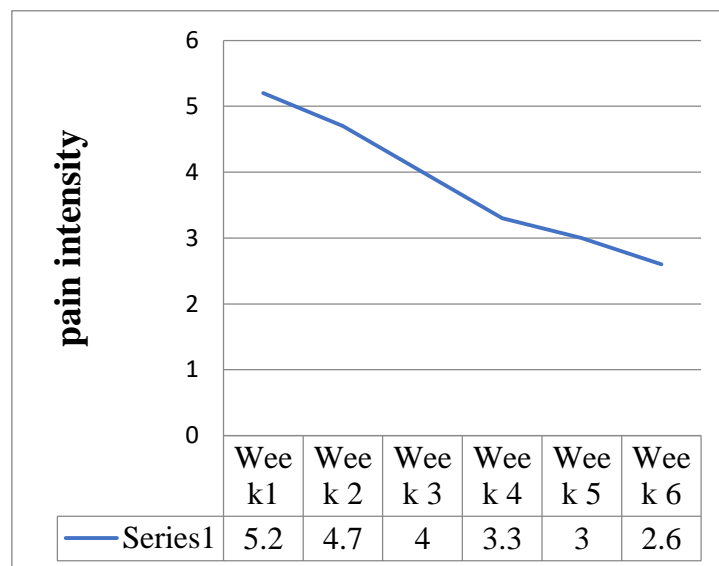
All the ten participants as reflected in Table A had a weekly mean pain numerical rating score (first, second, third, fourth, fifth, and sixth) of  $5.20 \pm 1.69$  with a range of 2.00-7.00,  $4.70 \pm 1.49$  with a range of 2.00-7.00,  $4.00 \pm 1.33$  with a range of 2.00-6.00,  $3.30 \pm 0.95$  with a range of 2.00-5.00,  $3.00 \pm 1.25$  with a range of 1.00-5.00 and  $2.60 \pm 1.17$  with a range of 1.00-5.00, respectively.

**Table B:** Wilcoxon-sign rank test relating to pain numeric rating score

Variable	Mean	± SD	z-score	p-value	
Overall	Wk1	5.20	1.687	-2.816	0.005
	Wk 6	2.60	1.174		
1 <sup>st</sup> /2 <sup>nd</sup>	Wk 1	5.20	1.687	-2.236	0.025
	Wk 2	4.70	1.494		
2 <sup>nd</sup> /3 <sup>rd</sup>	Wk 2	4.70	1.494	-2.333	0.020
	Wk 3	4.00	1.333		
3 <sup>rd</sup> /4 <sup>th</sup>	Wk 3	4.00	1.333	-2.646	0.008
	Wk 4	3.30	0.949		
4 <sup>th</sup> /5 <sup>th</sup>	Wk 4	3.30	0.949	-1.342	0.180
	Wk 5	3.00	1.247		
5 <sup>th</sup> /6 <sup>th</sup>	Wk 5	3.00	1.247	-1.633	0.102

Wk 6      2.60      1.174

Wilcoxon sign-rank test was used to determine the difference in the participants' pain intensity. The overall p-value of 0.005 (Table B) was found to be statistically significant at 0.05 level of significance. The p-value from the 1<sup>st</sup> week to the 4<sup>th</sup> week was significant (1<sup>st</sup>/2<sup>nd</sup> week = 0.025, 2<sup>nd</sup>/3<sup>rd</sup> week = 0.020 and 3<sup>rd</sup>/4<sup>th</sup> week = 0.008). However, the last two weeks (4<sup>th</sup>/5<sup>th</sup> and 5<sup>th</sup>/6<sup>th</sup> weeks) produced non-significant values of 0.180 and 0.102 respectively. The results are further buttressed by the line graph in fig.A



**Fig. A:** Line graph showing the weekly progression of pain numerical score

### 4. Discussion, Conclusion and Recommendations

The findings of this study provided information on the efficacy of a six-week tripartite Physiotherapeutic modality on non-specific CLBP sufferers' pain intensity. It was observed that the improvement in the outcome measure was pronounced in the first four weeks of the intervention and gradually tapers to the sixth week. The result of the Wilcoxon sign-rank test led to the rejection of the null hypothesis on this issue which implies that the combination of these modalities had substantial effects on participants' pain intensity. This outcome gives further credence to the effectiveness of physiotherapy in managing CLBP. It is hereby recommended that physiotherapists should adopt the combination of different modalities in the management of CLBP. Moreover, other related studies should focus on large sample size in order to make their outcomes more generalizable to the target population.

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## Authors' Profile



**Ogundiran** Opeyemi Olufemi bagged a Bachelor of Medical Rehabilitation (Physiotherapy) from Obafemi Awolowo University, Ile-Ife, Nigeria in 2008. He also has Masters degree in Exercise Physiology from the University of Benin, Benin city, Nigeria. He currently works as a clinical physiotherapist at the Wesley Guild Hospital, Ilesha unit of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria.



**Ogunsanya** Gbolade Isaac graduated from Obafemi Awolowo University, Ile-Ife, Nigeria in 2010 with a Bachelor's degree in Medical Rehabilitation (Physiotherapy). He also has Masters of Public Health (MPH) in Field Epidemiology from the University of Ibadan, Nigeria. He currently works as a clinical Physiotherapist at the Wesley Guild Hospital unit of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria