

The Effect of a Six-Week Structured Physiotherapeutic Modality on the Chronic Low Back Pain Sufferers' Activities of Daily Living

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Abstract

The objective of this six weeks quasi-experimental study was to determine the effect of a structured physiotherapeutic treatment plan in the management of non-specific chronic low back pain on the sufferers' activities of daily living which served as the principal outcome measure. Ten (10) participants who met the inclusion criteria were purposively recruited for this research, and a one group pretest posttest design was adopted. A treatment protocol involving the combination of fifteen minutes of Infrared Radiation (IR), twenty minutes of Transcutaneous Electrical Nerve Stimulation (TENS) and ten minutes of Soft Tissue Massage (STM) was used in the management of the condition. Each of the participants received treatment three times a week for six weeks duration and all of them duly completed the study. Data were collected, processed and analyzed descriptively and inferentially. Wilcoxon Signed-Rank test was utilized in testing the null hypothesis at 0.05 level of significance. Statistical analysis revealed a significant improvement in the sufferers' activities of daily living, hence, it was concluded in this study that the combination of the above physiotherapeutic modalities (IR, TENS and STM) was effective in the management of chronic nonspecific low back pain using activities of daily living as the major dependent variable.

Keywords: Non-specific chronic low back pain; Activities of daily living; Infrared radiation; Transcutaneous electrical nerve stimulation; Soft tissue massage

Introduction

Low Back Pain (LBP) is a leading cause of disability and has been cited as the fifth most common reason for physician visits [1]. In the most recent global burden of disease study, it was identified as the biggest contributor to Years Lived with Disability (YLDs). Its cause is usually mechanical, non-mechanical or referred pain [2] although it is influenced by a lot of factors which might catalyze its chronicity, contributing to poor prognosis and prolonged disability [3]. There is little difference in the prevalence of LBP among Africans compared to their counterparts in the developed countries [4]. Chronic Low Back Pain (CLBP) is even a more difficult condition because its management still remains increasingly tasking and is usually associated with sleep problems such as: disturbances during sleep, short sleep duration and ultimately dissatisfaction with the quality of sleep [5].

For the purpose of categorization, CLBP is defined as pain at the low back region that has lasted for more than twelve weeks (3 months). A study carried out in 2002 by Spenkelink, Hutten, Hermens and Greitemann indicated that CLBP patients showed a lower [6] activity pattern compared with controls and this was reflected in a lower walking step frequency during the day and evening, more lying time during the day, lower physical activity level, less standing time and more lying time during the evening. A systematic review conducted in 2010 by Lin, McAuley, Macedo, Barnett, Smeets and Verbunt, revealed that there was a moderate correlation between physical activity and disability for persons with CLBP [7], which implied that its sufferers with high levels of disability are also likely to have low levels of physical activity.

Current CLBP treatment techniques can be classified into: non-invasive, non-drug pain management (Physical therapy), non-invasive, pharmacologic pain management and invasive pain management (surgery/injection). The major goal of treatment for CLBP is for a patient to return to his or her desired level of activities and participation, as well as the prevention of recurrences [8]. Prolonged in-take of analgesics has been found to cause negative effects on the human body. A fresh source of concern is the suggestion that chronic pain is one of the primary reasons why people get addicted to prescription painkillers such as opioids [9]. It is however imperative to manage CLBP in a manner that will cause little or no harm to its sufferer through the use of non-invasive, non-drug pain management using combined modalities. Hence, this study sought to do justice to that by determining the efficacy of a six-week structured Physiotherapeutic modality on CLBP sufferers' activities of daily living.

Methods

The design selected was quasi-experimental. Inclusion criteria were: participants should be above eighteen years, they should be ready to comply with the management protocols, and must have had a nonspecific CLBP (LBP which has lasted for a minimum of twelve weeks). Individuals with history of tumors, acute spinal inflammatory disease, severe cardiorespiratory or metabolic diseases, poorly controlled blood pressure, heart rate and respiratory rate, metallic implant/pace-maker, recently diagnosed systemic infection and bone disease were all exempted from the study. Pregnant women were also excluded from the research. Ethical clearance was obtained from the University of Benin Teaching Hospital, Benin City, Edo State, Nigeria while informed consent forms were duly filled by the participants. Ten patients (four males and six females) referred from the Department of Orthopedics and Traumatology to the Physiotherapy Department of the same establishment were purposively recruited for the study.

Each participant was treated with a tripartite management approach: Infrared Radiation (IR), Transcutaneous Nerve Stimulation (TENS), and Soft Tissue Massage (STM) and they adopted a prone position throughout the treatment session. The BELA Infrared Light Radiator was kept at a distance of 50 to 70 centimeters from the skin surface of the low back region in order to prevent burns injury and this lasted for fifteen minutes. Four self-adhesive electrodes which are part of the accessories of the TENS device (TENS 3000, 3-MODE with Timer TENS unit) were subsequently placed on/around the painful area of the low back region. The current intensity of the TENS device which ranges from 0 to 80 mA at both terminals was adjusted to each participants' tolerance level. Both pulse rates and pulse widths were kept at constant values of 100 Hz and 200 ms respectively for each

patient while the burst mode was used for all of them. Kneading massage was done to the low back region for ten minutes. All participants were treated three times a week for a period of six weeks. The pain intensity, activities of daily living (ADL) and spinal flexibility (SF) of each participant served as outcome measures and were assessed on a weekly basis using the Pain Numerical Rating Scale (PNRS), Oswestry Disability Index (ODI) and the Sit-and-reach box respectively. The major outcome measure considered in this research article is the ADL and it involved the ODI, which is a questionnaire designed to measure limitations of various activities of daily living of people with low back pain. It has a minimum score of zero and a maximum of one hundred; the lower the score, the lesser the disability severity emanating from the LBP [10].

Participants	Gender	Age (years)	Marital Status	Occupation	Settlement	Pain duration (months)	Pre-treatment ADL (%)
A	Female	72	Married	Trader	Urban	12	54
B	Male	40	Married	Air Force Officer	Urban	4	16
C	Female	50	Married	Civil-servant	Urban	5	60
D	Male	44	Married	Army Officer	Urban	4	46
E	Male	54	Married	Artisan	Urban	10	58
F	Female	74	Widowed	Retired Matron	Urban	12	44
G	Female	46	Married	Nurse	Urban	7	44
H	Female	48	Married	Teacher	Urban	3	16
I	Female	61	Married	Retired civil servant	Urban	8	16
J	Male	56	Married	Public servant	Urban	5	10

Table 1: Showing the characteristics of each participant such as; gender, age, marital status, occupation, settlement, pain duration, and pre-treatment ADL.

Characteristics of the Participants

The ten participants are made up of six females and four males residing in Benin metropolis (an urban settlement). They had a mean age, mean pain duration, and mean pre-treatment ADL of 54.50 years \pm 11.48 with a range of 40.00 to 74.00, 7.00 months \pm 3.37 with a range of 3.00 to 12.00, and 36.30% \pm 19.56% with a range of 10.00 to 60.00 respectively (Table 1).

Results

The results are presented in Tables 2 and 3 and Figure 1.

All the ten participants had weekly mean activities of daily living score (first, second, third, fourth, fifth and sixth) of 36.30% \pm 19.56% with a range of 10.00-60.00, 33.40% \pm 18.90% with a range of 10.00-56.00, 30.00% \pm 17.71% with a range of 8.00-54.00, 27.20% \pm 17.42% with a range of 6.00-54.00, 24.00% \pm 16.92% with a range of 6.00-54.00 and 22.60% \pm 16.81% with a range of 6.00-52.00, respectively.

Wilcoxon sign-rank test was used to determine the difference in the participants' activities of daily living and the overall p-value of 0.005 was found to be statistically significant at 0.05 level of significance. The results are further buttressed by line graph in Figure 1.

Participant S	1 st week	2 nd week	3 rd week	4 th week	5 th week	6 th week
A	54	50	44	40	38	34
B	16	12	10	10	8	6
C	60	56	54	54	54	52
D	46	42	38	34	30	30
E	58	56	52	50	44	44
F	44	40	36	30	24	24
G	44	40	32	26	16	10
H	16	14	14	10	8	8
I	16	14	12	12	12	12
J	10	10	8	6	6	6

Table 2: Showing weekly progression of activities of daily living scores (percentage) of individual sufferers.

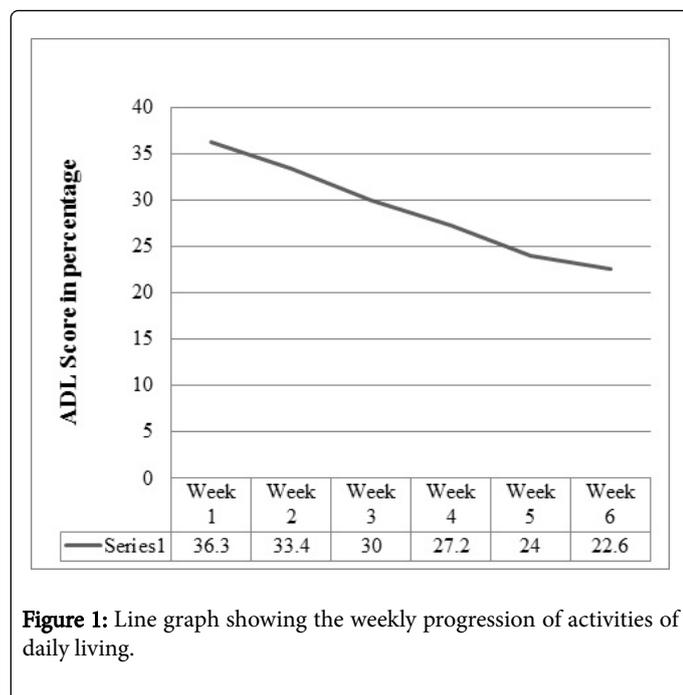


Figure 1: Line graph showing the weekly progression of activities of daily living.

Weeks		Mean	± SD	z-score	p-value
Overall	Week 1	36.3	19.562	-2.809	0.005
	Week 6	22.6	16.814		
1st/2nd	Week 1	36.3	19.562	-2.536	0.006
	Week 2	33.4	18.904		
2nd/3rd	Week 2	33.4	18.904	-2.379	0.007
	Week 3	30	17.714		
3rd/4th	Week 3	30	17.714	-2.375	0.017
	Week 4	27.2	17.415		
4th/5th	Week 4	27.2	17.415	-1.633	0.017
	Week 5	24	16.918		
5th/6th	Week 5	24	16.918	-1.841	0.066
	Week 6	22.6	16.814		

Table 3: Showing Wilcoxon-sign rank test relating to activities of daily living.

Discussion

The findings of this study provided information on the effect of a six-week structured physiotherapeutic modality on the CLBP sufferers' activities of daily living. It was observed that the change in the ADL score was pronounced in the first four weeks of the intervention and gradually tapered towards the sixth week. This observation could be as a result of the physiological adaptation of the CLBP to the physiotherapeutic modalities being used. However, the overall p-value (difference between week one ADL and week six ADL) of 0.005 was found to be statistically significant at 0.05 level of significance. This

result of the Wilcoxon sign-rank test led to the rejection of the null hypothesis. The progressive decrease in the activities of daily living score of the sufferers may be attributable to decrease in pain intensity experienced by the sufferers which led to a significant improvement in their independence level after six weeks of the trichotomic physiotherapeutic intervention. This implies that the combination of these modalities had a positive effect on participants' activities of daily living. This is line with the view of Ojeniweh, Ezema, Anekwu, Amaeze, Olowe and Okoye, Cherkin, Sherman, Kahn, Wellman, Cook, Johnson, Erro, Delaney and Deyo and Facci, Nowotny, Tormem and Trevisiani [11-13]. These studies reported a significant improvement in the activities of daily living of their participants following the use of physiotherapeutic modalities such as IR, STM and TENS.

Conclusion and Recommendations

Based on the effect of a six-week structured physiotherapeutic treatment protocol in the management of chronic low back pain, it was concluded that the intervention assisted in improving the ADL among CLBP sufferers judging by the result of the study. It is therefore posited that CLBP sufferers will benefit from the non-invasive, non-drug pain management which is tenable from this tripartite management modality. Future studies on the efficacy of the physiotherapeutic management of CLBP is hereby recommended as our study is one-armed. These prospective studies should involve large sample sizes with appropriate sampling techniques, control group which would give more credence to the outcome of these studies, and the comparison of the different groups of combined modalities in order to determine their relative efficacy in the management of this condition.

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