

EFFECT OF SIX-WEEK THERAPEUTIC PROGRESSIVE STRENGTHENING EXERCISE ON PAIN AND FUNCTIONAL CAPACITY AMONG PATIENTS WITH CHRONIC LOW BACK PAIN IN OSUN STATE.

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Abstract

The study investigated the effects of six-week progressive strengthening exercise on pain and functional capacity among patients with chronic low back pain. Forty-two men and women patients within the age range of 25-60 years recruited from Osun State Hospital (Asubiaro) and Lautech Teaching Hospital all from Osogbo Metropolis were used for the study. A pretest-Posttest design was adopted while purposive and total enumeration sampling techniques was used to select the participants. The Instrument used for data collection were Visual Analogue Scale (VAS) and Oswestry Low Back Pain Disability Questionnaire. The result from this study indicated a significant low pain and functional inability respectively after a six-week progressive strengthening exercise among patients. This means that six weeks progressive strengthening exercise is effective in reducing pain and increasing functional capacity among patients with low back pain and therefore recommended as intervention in the management of chronic low back pain.

Introduction

Chronic Low Back Pain (CLBP) is the most common cause of musculoskeletal complication in the world; affecting all genders across all races - the rich, the poor, the young and the old from the layman on the street to health care providers in health institution. Most people with CLBP usually experience symptoms of lower back pain which causes a major burden to society and continues to be one of the most common challenging problems in primary health care (Birken, Vantulder, Reis, Schoene, Croft & Hermoni, 2017; Adigun, 2019; Waddel, 2019). The increased prevalence of CLBP and its impact around the world has been so broadened to second physician visit globally while in Africa, it was 30% and

62% for adolescents and adults respectively (Louw, Morris, & Grimmer-Somers, 2017). Low Back Pain (LBP) affects 8 out of 10 people with mechanical injury, over used thus muscular laxity and malfunction from many spinal structures including ligaments, facet, joint, vertebral periosteum, the paravertebral musculature and fascia, blood vessels, the annulus fibrosis and spinal nerve root. This etiology explains the low back pain threshold which is radiating and transient; localizing at the low back region (Deyo, 2016).

Low back pain has been classified as Acute - from onset to six weeks; Sub acute - above six weeks to six months and

Chronic-lasting for more than six months with each classification having varying pain threshold and its accompanying functional disability. Many popular treatment options are clinically available to manage CLBP with pain relievers as the primary drugs. However, the use of drug only suppresses pain temporarily and at times with consequent side effects. Clinically physical agents like Short Wave Diathermy (SWD), Ultrasound (US), Infrared Ray (IR), Low Frequency Current Interferential Therapy (LFCIT), Transcutaneous Electrical Nerve Stimulator (TENS), Therapeutic Massage (TM), Cold and Ice water Cry therapy (CICT), Spinal Manuel Therapy (SMT) have all proved effective in the management and treatment of CLBP. However, in the studies have shown that some patients with CLBP prefer heating option alternatives possibly because of its arousal effect. Heating options also gives temporary pains relief with accompanying side effects like drugs. It is in this perspective that therapeutic progressive strengthening exercise programme was considered and used as an alternative in the treatment and management of CLBP.

The use of exercise in the management of CLBP has been authenticated by various authorities such as Ulriah, 2015; Val-Tulder and Bourbandir, 2017; Van-Valde, and Mierau, 2016; etc.

Methods

A total of 42 subjects with CLBP recruited from Osun State Hospital (Asubiaro) and Lautech Teaching Hospitals were used. Only patients aged between 25 to 60 years with CLBP of not less than 3 months

duration and had not had any surgical operation were included. Participants were engaged in 5 minutes warm up of walking and stretching exercises. The strengthening exercise comprised leaning against a wall with back and from a slightly squat position flexing both hip and back muscles about 50 degrees with knees placed to about 30 degrees. From this position, participants were instructed to contract the abdominal muscles for 15 seconds per each contraction phase. Patients repeated this procedure 20 times then rested for 5 minutes as a set. An exercise session involved 3 sets which were performed 3 times per week with an increase of 5 contractions per week. The programme lasted six weeks.

Two instruments were used for data collection in this research. The Visual Analogue Scale (VAS), having ten (10) items calibrated with zero (0) indicating no pain and ten (10) indicating highest pain, was used to assess pain threshold. The other item was Owestry Low Back Pain Disability questionnaire with ten (10) sections describing the impact of pain on subject's daily activities. Each section is scored 0-5 with 5 indicating more severe impact of CLBP. Progressive Strengthening Exercise is an exercise protocol meant to elicit response on pain threshold and functional disability from the patients. The exercise involves squatting, flexing, contracting and tightening low back muscles in a systematic progressive process. A wall on which patients lean to perform the exercise and a clock from which patients were timed were also used. The data obtained were analyzed using statistical tools of mean, standard deviation and t-test; inferences were taken at 0.05 alpha level.

Results

The results of this research work are presented as follows:

Table 1: Physical characteristics of subjects

Variable	N	Mean	SD	SE
Age (years)	42	46.625	10.77	2.199
Height (m)	42	1.656	1.505	0.75
Weight (kg)	42	81.134	15.989	2.467
BMI (kg/m ²)	42	27.657	4.789	0.998
Pain duration (years)	42	3.826	4.663	0.719
Pain threshold	42	1.857	1.555	0.239

Table I above describes the characteristics of the 42 CLBP patients who participated in this study. Their mean age was 46.625+ 10.77 years; mean height was 1.656+0.505 meters; mean weight was 81.154 +15.989 kilograms; mean BMI was 27.657 +4.789; mean pain duration was 3.826+4.663 and mean pain threshold was 1.857 +1.555.

Table II Summary of paired sample t-test on pain threshold among CLBP after six week of progressive strengthening exercise

Variable	N	Mean	SE	df	t	Prob.
Pre	42	7.929+10.77 10.77	0.172	41	17.468	0.001
Post	42	3.071 +1.5051.505	0.254	0.75		

$$T(41) = 1.684 < 0.05$$

This result shows a significant decrease in pain threshold following a six-week progressive strengthening exercise among CLBP patients ($t(41) = 17.468$) which is more than the critical value 1.684 $p < 0.05$. This implies that six weeks progressive strengthening exercise offer therapeutic effect in decreasing pain on CLBP.

Table III Summary of paired sample t-test on functional inability among CLBP after six week of progressive strengthening exercise

Variable	N	Mean	SE	df	t	Prob.
Pre	42	53.923±16.49	2.545	41	20.847	0.001
Post	42	38.947±11.45	1.151			

T (41) = 1.684 < 0.05

This result indicates a significant decrease in functional inability after a six-week progressive strengthening exercise ($t(41) = 20.847$) which is greater than the critical value 1.684 $p < 0.05$. This implies that six weeks progressive strengthening exercise offer therapeutic effect in increasing functional capacity of CLBP patients.

Discussion

The objective of this study was to find the therapeutic effects of six weeks progressive strengthening exercise on pain threshold and functional inability among CLBP patients. The results indicate a significant reduction in pain threshold which is in line with Kankaanpää, Taimala, Airakoski and Hanninon (2019) who also recorded a significant reduction in pain threshold (54%) after 12 weeks rehabilitation programme of strengthening exercise. The possible reason for the similarities between these two studies could be the exercise protocol (strengthening exercise) used in both studies. In the opinion of Mckanzee (2015), strengthening exercises are effective in reducing pain among CLBP patients. This present study finding is also in conformity with Waddell (2018) who utilized progressive strengthening exercise for four weeks in a circuit format at the end of which a significant reduction in pain threshold was recorded. The possible similarities between these studies could be due to the progression in the number of

repetition or difficulty level used in both studies. However, Bendix, Bendix, Labriola, Haeustrope and Ebbahoj (2019) reported contrary to the present study. In their study, conclusion on functional restoration and outpatient physical training in CLBP stated that not all studies demonstrated pain threshold reduction with exercise. In a similar development, the present study is in line with Rahman and Mazloun, (2012) who assessed the effects of eight weeks Strengthening and Aerobic exercise on pain severity (assessed by VAS) and function in patients with Knee Rheumatoid Arthritis (assessed by Western Ontario and McMaster Osteoarthritis Index) and observed a significant pain decrease in experimental groups. The possible similarities could be due to the exercise protocol (strengthening exercise) used in both studies.

The result of the present study shows a significant decrease in functional inability equivalent to 44.7% reduction in Oswestry disability score after six-week progressive strengthening exercise programme in the management of CLBP. This result is

similar to the findings of Vander-Valde and Mierau(2019) who used six-week conditioning programme on adult patient with CLBP and recorded a 33% reduction of Oswestry Disability Score. The possible similarities between the two researches could be due to the research instrument (Owestry Disability Questionnaire) used in both studies. The result of the present study is also similar to the findings of Frost, Waber,Moffet, Moser and Fairback (2015) who after four weeks of progressive fitness programme involving adults with CLBP, recorded a 35% reduction in Oswestry Disability Score in progressive fitness group compared to 7% reduction in control group. These similarities could be related to the progression in the exercise programmes in both studies. In a similar development, the present study is in line with Rahman and Mazloun (2012) who assessed the effects of eight weeks Strengthening and Aerobic exercise on pain severity (assessed by VAS) and function in patients with Knee Rheumatoid Arthritis (assessed by Western Ontario and McMaster Osteoarthritis Index) and observed that the experimental groups had a better functional ability than the control group after eight weeks of strengthening and Aerobic exercise even though the location of pain differs in the two studies.

Conclusion and Recommendations

Based on the finding of this study, it is concluded that six weeks progressive strengthening exercise reduces various degrees of pain (pain threshold) felt by CLBP patients. It is also concluded that six weeks progressive strengthening exercise reduces the functional inability among patients with CLBP and by implication

increases the functional capacity of patients with CLBP.

From the finding of this study, it is recommended that progressive strengthening exercise should be incorporated in the treatment and management programmes of patients with CLBP as the aim of the research is to overcome the use of sophisticated equipment in the management of CLBP. Patients-centered approach should be encouraged in CLBP study where the population of patients with CLBP outnumbered the equipment available.

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