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The effect of treadmill walk with abdominal bracing versus usual care on functional limitation and fear-avoidance behaviours in the management of non-specific low back pain—a randomized control study

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Abstract

Background: The use of a combined abdominal bracing technique concurrently with treadmill walking exercise seems not to have been widely investigated, The use of either abdominal bracing and treadmill walk as a single individual method of treatment has proven to be of immense benefit in athletic training and amelioration of pain and functional limitation among different age groups suffering from chronic low back pain. Thus, the need to investigate whether the combination of abdominal bracing and treadmill walking would produce greater benefits than when the exercises are carried out in isolation in the management of chronic low back pain patients.

Study design: The study was a randomized control**.**

Participants: Thirty-three participants who met the inclusion criteria with age from 18 to 65 participated in the study.

Aim: This study aimed to compare the effects of treadmill walk with and without abdominal bracing versus usual care on pain, functional limitation and fear-avoidance behaviours among patients with non-specific chronic low back pain.

Methods: Thirty-three non-specific chronic low back pain (NSCLBP) patients were randomized into three groups treadmill walk without abdominal bracing (TWW), treadmill walk with abdominal bracing (TWAB) and usual care (UC). Interventions were carried out for 6 weeks.

Outcome measure: Pre and post-intervention scores of pain intensity, functional limitation, and fear-avoidance belief were assessed with box numerical pain rating scales, Oswestry disability index and Fear-Avoidance Belief Questionnaire, respectively.

Results: Pre-intervention scores of pain intensity functional disability and fear-avoidance belief did not show significant differences among the groups ($P > 0.05$). Within-group analysis with paired t-test showed that pain intensity and functional limitation were significantly reduced after 6 weeks of intervention among the 3 groups. Fear-avoidance belief recorded statistical reduction among the 2 treadmill procedures (TWAB and TWW) groups ($P<0.05$) but not in

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the usual care groups ($P>0.05$). Participants in the TWW group showed greater improvement than those in TWAB in terms of reduction in pain intensity (24.17±16.49), functional limitation (7.00±5.97, $P = 0.001$) and fear- avoidance (30.83±17.90, $P = 0.003$)

Conclusion: Treadmill walk with and without abdominal bracing as well as usual care could be effective in reducing pain. However, treadmill walk without abdominal bracing was more effective in improving back function in terms of reduction in pain intensity, functional limitation (as reported by the Oswestry scale) and reducing fear-avoidance behaviour (as reported by fear-avoidance belief scores).

Trial registration: PACTR, PACTR201910691645076. Registered on 22 October 2019.

Keywords: Treadmill walk, Core stability muscle, Facilitation, Abdominal bracing, NSCLBP

Introduction

Back pain is now the most common musculoskeletal complaint being reported among almost all age groups, the episodic experience is expected once in every individual during their lifetime [1]. Low back pain (LBP) is a very broad musculoskeletal disorder affecting several age groups in different communities irrespective of the level of education [2]. Up till this present time, it was said to have mostly resisted pharmaco-therapeutic advances provided by modern medicine, thereby failing categorization and its effective management leading to recurrence and eventual chronicity. Prevailing knowledge puts the incidence and impact of LBP at a very substantial spread since the advent of organized medicine [3]. It has also been found out to be an enormous problem that continues to pose a major health challenge associated with functional disability, while its global burden in terms of economic loss among other musculoskeletal conditions such as Hip and knee arthritis for individuals and society comes at a great cost [4, 5]. Africa has been the major hit of this musculoskeletal burden, while a lifetime prevalence rate of 70% for developing countries was widely reported by [6]. Clinically, LBP is a multifactorial condition with a wide variety of associated physical dysfunctions which includes hypomobility around the lumbar region, reduced lumber function and performance as well as recalcitrant pain and functional disability [7].

Impairments such as pain and functional disability usually experienced by low back pain sufferers have been attributed to the weakness of core muscles among other factors that provide stability to the low back [8]. The core is comprised of passive and active structures and a neural control unit [9]. The core comprises the local and global group of muscles, The local core muscles (local stabilizer) include the transverse abdominis, multifidus, internal obliques, transversospinalis, and pelvic floor muscles; the global core muscles include the erector spinae, external obliques, rectus abdominis, and quadratus lumborum [10].

Exercises remain the intervention with the highest level of evidence in terms of conservative management of CLBP with positive impacts on pain reduction, pain recurrence, functional limitation as well as the quality of life including mental health [11]. However, there have been raging controversies about which type of exercise treatment works best for the management of non-specific chronic low back pain, especially its associated functional limitation, pain and fear-avoidance behaviours. Current trends in terms of findings from RCT and systematic reviews appeared to be in favour of trunk stabilization exercises, abdominal bracing and general trunk endurance exercises [12–15].

Core training for effective functional movement via the use of facilitated core stabilization training such as abdominal bracing has become a useful exercise in the rehabilitation of spinal disorders and athletic sports [16]. Abdominal bracing is subtle in drawing of the lower abdominal muscles. It is a form of core muscle activation exercise where the muscles surrounding the trunk are gently activated, it requires the engagement of the entire trunk, diaphragm and lumbo-pelvic floor muscles [17]. Some researchers have shown that gentle abdominal bracing can lead to improvement in trunk muscle functions such as co-contraction of deep stabilizing muscles, which facilitates the attainment of neutral spine posture, recovery from injury and relief of chronic lower back pain [17–19].

Treadmill walk appears to be gaining more acceptance as a mode of exercise in the rehabilitation of function and recovery among patients with spinal disorders [20, 21]. This might be partly due to its demonstrative effects on improving muscular function in both upper and lower limbs as well as activation of global back and abdominal muscles during prolonged trunk extension with associated cardiovascular endurance benefits [22, 23]. However, both exercise contributes differently in core strengthening development and trunk muscle endurance facilitation, therefore this present study aimed to investigate the effects of combined abdominal bracing with treadmill walk and treadmill walk alone on functional limitation, Fear-avoidance behaviours and pain in adults with chronic non-specific low back pain.

Materials and methods

The methodology used in the recruitment, assessment and treatment procedures in this study followed the CONSORT statement guidelines for the conduct of randomized control trials

Study design

A pre and post-test randomized control pilot study among patients with NSCLBP. The pilot is being carried out in preparation for a large randomized controlled trial in which treadmill walk and abdominal bracing core muscle activation will be the main intervention.

Participants

Recruitment and sample size estimation Non-specific low back pain aged between 18 and 65 years referred from the orthopaedics and spinal surgeons of the National Orthopaedic Hospital Dala who willingly give their consent were recruited to participate in the study.

A sample size of 33 participants was involved in this study, this sample size was based on the pilot study sample size estimation rule of thumb for RCT involving continuous variables; $n = 2\ (Za + Z1 - \beta)^2\sigma^2/\Delta^2$, Where n = sample size, a two-sided significance of $P < 0.05$ with 0.80 power [24]. $Z\alpha = 1.96$ (two-tailed) and $Z1\text{-}\beta = 0.84$, studies that adopted similar sample size estimation, have been reported [24–29]. Thus, the sample size for the present study was calculated to be 2 (0.84) (0.36)/0.64, = 8.82. An attrition rate of 20% was added, thus, a total of 33 were consecutively recruited.

Inclusion criteria

The main inclusion criteria were patients with NSLBP of mechanical origin with no radicular symptoms, and aged 18 to 65 years old. The patients were eligible irrespective of their educational status, in as much as they could read in either Hausa or English languages and consented to participate in the study.

Exclusion criteria

Participants with a history of previous surgery to the spine and/or lower extremity and musculoskeletal conditions associated with pain and reduced mobility affecting the spine and /or extremities were excluded. Participants with medical conditions that might affect the use and correct performance of the treadmill protocol exercises were also excluded.

Procedure

Ethical consideration Ethical clearance was sought and obtained from the Research and Ethical Committee of National Orthopedic Hospital, Dala, Kano State (Ref: NOHD/RET/ETHIC/60), before the commencement of the study. Informed consent was sought and obtained before participants started the intervention. Participants were given enough time to consult with their doctors and make informed decisions of their suitability to participate in the trial.

Screening for inclusion criteria Before randomization, prospective participants were screened for inclusion criteria and for safe use of treadmill by a research assistant, For safety to use of treadmill exercises Participants were screened for any cardiovascular abnormality such as elevated blood pressure and all acute musculoskeletal injuries or symptoms of physical limitations and cardiovascular complications that might affect the safety of carrying out treadmill based exercises using self-administered physical activity readiness questionnaire (PAR-Q) as described in the previous study [30, 31].

Randomization

The individuals that met the eligibility criteria were randomized by an assistant who did not have the knowledge of treatment procedures in groups A, B, and C. A simple randomization procedure was followed by the use of a computer-generated random number to determine the allocation sequence before the allocation of participants to the study group as described by [32]. The participants in group A carried out abdominal bracing while walking on the treadmill together with usual care, while the Participants in Group B carried out treadmill walk with usual care but without abdominal bracing and participants in Group C will only have usual physiotherapy care.

Assessments and outcome measures

Demographic variables Social-demographic demographic variables of the participants such as age, gender history of the recent injury to the spine and or extremities using the researcher-developed data collection form. The weight and height of the participants were measured using a bathroom weighing scale (Secca Germany) and a height meter (A Charder HM200P Portstad Portable Stadiometer (Charder Medical, Taiwan, ROC, 2007) to the nearest 0.1 kg and 0.1 m, respectively.

Outcome measures

Oswestry Disability Index scores of functional limitation were the primary outcome measure in this pilot study while other outcome measures will be secondary. Thus, changes in ODI after the intervention will provide data that will be used for sample size estimation in large RCT. Assessment of outcome measures will be carried out pre and post 6-week exercise intervention.

Pain intensity Pain intensity was measured with box numerical pain rating scale (BNPRS): The Box-21 is identical to the Box-11, but presents 21 boxes in a row, with numbers labelled from 0 to 100 in increments of 5 [33]. A scale with 21 levels has been shown to provide a sufficient level of discrimination for chronic pain patients to describe their pain based on both psychometric properties and preference, it was thus proposed by [33] that the Box-21 is the instrument of the first choice in a mixed or heterogeneous population of patients such as low back pain. Reliability has been demonstrated even in some other musculoskeletal conditions ($r = 0.96$ and 0.95, respectively) with a validity of $r= 0.86$ to 0.95 when compared to VAS [34].

Functional disability Functional Disability was measured with the modified Oswestry Disability Index (ODI), The modified Oswestry Disability Index which is also known as the Oswestry Low Back Pain Disability Questionnaire is an important tool that researchers and disability evaluators use to measure a patient's permanent functional disability. ODI is the most commonly used and cited tool for this purpose, followed by the Roland Morris disability questionnaire (RMDQ) This test is considered the gold standard of low back functional outcome tools. This will be used to assess the level of disability among the participants. It has an internal consistency of 0.75 and test-retest reliability of 0.91 as reported by [35]

Interventions

Abdominal bracing Before walking on the treadmill, participants were shown the location of the core stability muscles as described by [36]. In crook lying position, they were trained on how to carry out abdominal bracing manoeuvres to activate core muscles as described by [37]. Only those who can brace abdominal muscles effectively in crook lying, standing and walking positions were allowed to progress to treadmill walk combined with abdominal bracing exercises. Abdominal bracing for the activation of the core muscle was confirmed with palpation of the transversus abdominis muscles. Effective abdominal bracing for activation of core muscles in this study is described as the ability to achieve at least 10mmHg deflection on the scale of pressure biofeedback unit (PBU) in crook lying position while it was inflated to 70 mmHg initial pressure, the participants must be able to sustain abdominal bracing for 10 s in 10 successive attempts [37, 38]. Participants were asked to maintain abdominal bracing while walking on the treadmill by very gently contracting or tensing the abdominal wall, especially in the area below the belly button, keeping the inward curve in their lower back (avoid rounding their lower back), breathing normally throughout and not to hold their shoulders in elevated positions [39, 40].

Treadmill walk Participants in this group carried out treadmill exercises using the modified Bruce protocol as previously reported in previous chronic low back pain intervention studies [21, 41–45]. The detail of the protocol is as listed below;

Warm-up: Speed: 3.3 miles per hour (mph), 0% inclination and duration of 5 min
Speed: 3.3 miles per hour (mph), 0% inclination and duration of 5 min
Weeks 1: Speed: 3.3–5.0 mph (increase 0.5mph/ minute for 10 min), at 1 % inclination
Week 2: Speed: 3.3–5.0 mph (increase 0.5mph/ minute for 15 min), at 2 % inclination and total duration of 20 min
Week 3–6: Speed: 3.3–5.0 mph (increase 0.5mph/ minute for 20 min), 3 % inclination with subsequent 1% increase till 6 weeks

Usual care The patients received Infra-red radiation for 15 min before performing lumbar conventional physiotherapy exercises such as Flexibility exercise which involves single and double knee to the chest for stretching and flexibility of the back extensor and strengthening of the rectus-oblique muscles. In prone lying with pillow support with one leg sliding for strengthening the back extensor muscles, cycling in supine for strengthening the abdominal muscles and coordinating anterior and posterior lumbar muscles. Bridging exercises was also done for strengthening back extensor muscles as described by [46].

Exercise groups

GROUP A: treadmill walking combined with abdominal bracing and usual care (TWAB) Participants in this group were taught how to carry out abdominal bracing

before they were asked to combine it with walking on the treadmill as described above.

Group B: treadmill walk without abdominal bracing and usual physiotherapy care (TWW) Participants in this group performed treadmill walk using the modified Bruce protocol as described by [47] with usual care as described above, twice a week for 6 weeks.

Group C: usual physiotherapy care group (UC) Some of the best evidence in conventional or usual care physiotherapy as described by some scholars which were based on meta-analysis and systematic reviews as described above was applied to participants in this group [25, 47, 48].

Blinding

The physiotherapist evaluating the outcome measures was blinded to the participants' assigned intervention groups. The therapists providing the intervention were blinded to pre-treatment and post-treatment assessment scores before the analysis of the results.

Statistical analysis

The data analysis procedure was carried out using the SPSS 20th version software ((IBM Co., Armonk, NY, USA). Shapiro-Wilk test showed that all the data generated from the independent variables were normally distributed (P>0.05). Means and standard deviations were used to summarize the data such as age, height, weight, BMI and duration of back pain.

One-way analysis of variance (ANOVA) was used to analyse the difference between the scores obtained BPNRS, ODI, and FABQ pre and post-intervention. Paired t test was used to analyse pre-intervention and post-intervention differences between the independent variables within the individual groups.

Post hoc analysis was carried out to ascertain the clinical significance of the statistical difference observed between the independent variables. The level of significance was set at 0.05.

Results

Thirty-three participants met the inclusion criteria and were randomized into the 3 groups of interventions that comprises 11 participants each. However, a total number of 5 participants dropped out while 28 participants completed the study and underwent post-intervention assessments as presented in the flow chart (Fig. 1).

The mean age of participants in years ranges from 43.4 0 (±11.72), 36.00 (±17.80) and 43.0 (±14.81) in groups A, B and C, respectively. The BMI average scores were 23.32 (5.4) kg/m^2, 25.48 (5.37) kg/m^2 and 22.08 (4.81) kg/m^2. Age, weight, body mass index and height did not show significant differences among the groups at baseline (Table 1) (P> 0.05).

Table 2 shows the pre and post-intervention scores in pain intensity functional disability and fear-avoidance belief.

The pre-intervention scores of pain intensity. Functional disability and fear-avoidance did not differ significantly among the 3 groups (P > 0.05). Reduction in post-intervention pain intensity functional limitation was recorded by the 3 groups. The usual care group did not show improvements in the Fear-avoidance behaviour (58.16±17.26, p = 0.425) scores which were recorded by the TWW and TWAB groups The greatest improvement in terms of reduction in pain intensity (24.17±16.49), functional limitation (7.00±5.97) and fear-avoidance (30.83±17.90) were recorded by TWW group while the least improvements in pain functional limitation and fear-avoidance were recorded by the usual care group. The post -hoc analysis was significant in the domain of functional limitation in Groups A and B (TWAB 13.9±6.61, TWW 7.00±5.97, p = 0.001.) while the post-intervention score for Fear-avoidance belief was only significant in Group B (TWW 30.83±17.90, p =0.001) the least significant effect was in the usual care group (Table 3).

Discussion

Clinical guidelines from different parts of the world are unequivocal in their recommendations of exercises for the management of NSCLBP. However, these guidelines do not recommend a particular exercise; hence, the choice of exercise for chronic LBP largely depends on the preferences and the experiences of the clinicians It is important for the choice of exercise therapy to be easy to perform and effective in terms of reduction in pain, functional limitation and fear-avoidance. Thus, the objective of this study was to compare among the effects of treadmill walk with core muscle activation, treadmill walk alone and usual care in terms of functional limitation, fear of movement and pain intensity on patients with NSCLBP.

Findings from this study showed that treadmill walk with and without abdominal bracing as well as usual care when used as a separate intervention could be effective in reducing pain and functional limitation. The results of this study support previous studies that reported that treadmill exercises and motor control exercise in form of core muscle activation is effective in decreasng pain and activity limitation in patients with chronic LBP [41, 42, 48–50]. The 2 treadmill groups showed better results than usual care in the reduction

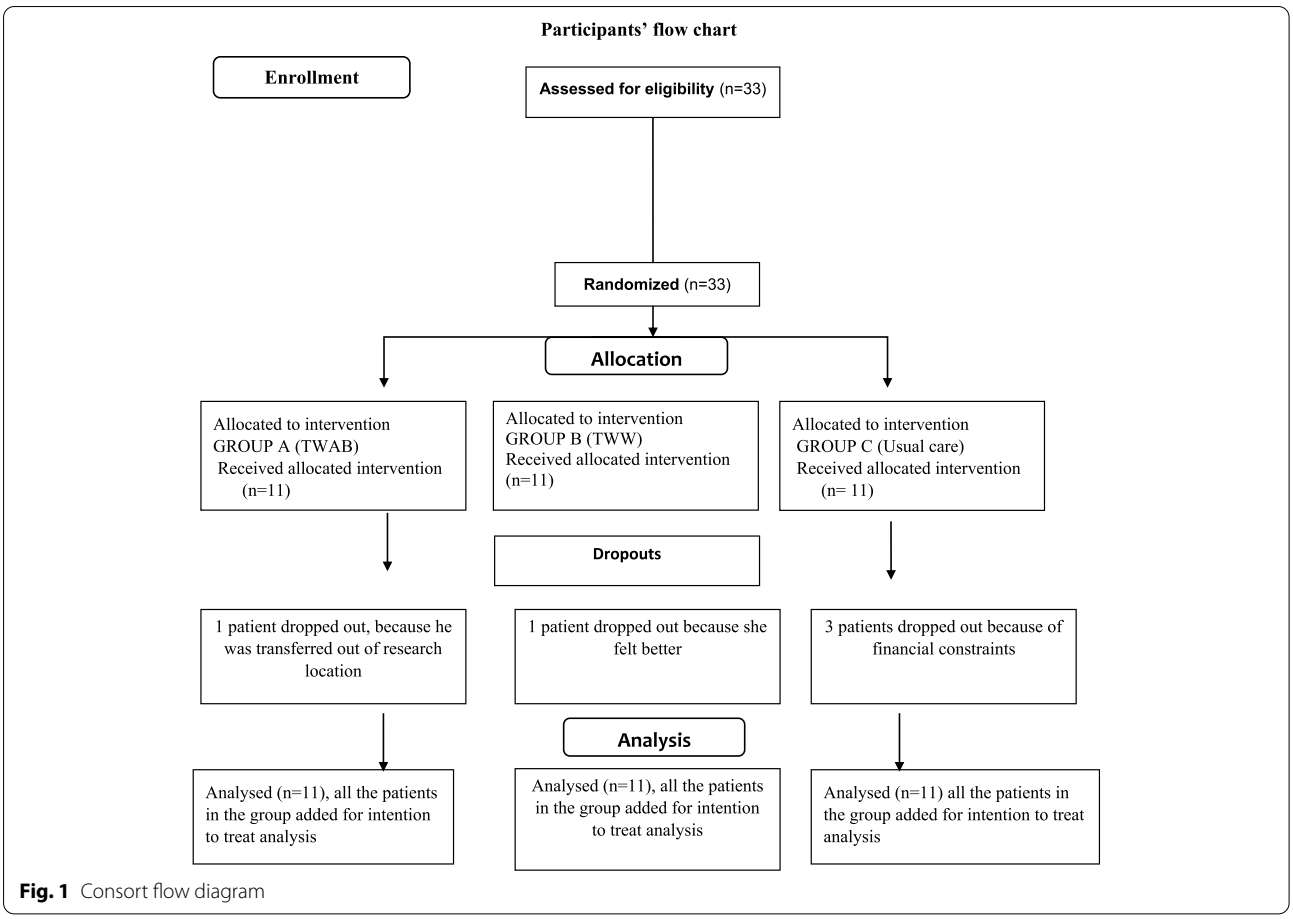

Fig. 1 Consort flow diagram

Table 1 Participants' socio-demographic characteristics at baseline

Variables value	GRP A (TWAB) Mean ±SD	GRP B (TWW) Mean ±SD	GRP C (UC) Mean ±SD	*F* value	*P* value
Age (years)	43.40±11.72	36.00±17.80	43.0±14.81	0.907	0.414
Height (m)	1.6± 0.11	1.64±0.10	1.60±0.74	0.18	0.221
Weight (kg)	62.58±12.6	70.0±16.48	57.50±11.29	1.27	0.106
BMI (kg/m^2)	23.32±5.4	25.48±5.37	22.0± 4.81	0.64	0.212
DOBP (months)	23.85±8.21	29.13±33.91	57.20±43.47	2.178	0.132

TWAB treadmill with abdominal bracing, *TWW* treadmill without abdominal bracing, *UC* usual care, *DOBP* duration of back pain, *SD* standard deviation

of fear-avoidance behaviour. Treadmill walk alone group recorded a better improvement average score but there was no statistically significant difference between t treadmill alone and treadmill with abdominal bracing in terms of all the study variables. Given these considerations, treadmill walks alone appear to be most appropriate. This result is in tandem with the results of a previous study carried out to compare the effects of general endurance exercises and stabilization exercises and found that the general exercise as walking reduces disability and pain in the short term better than a stabilization [50]. This result could also bag a question of whether or not every patient with NSCLBP should undergo stabilization exercises or whether it is only those patients with features of spinal instability and clinical prediction rules for improvement with spinal instability that should undergo core spinal muscles activation training?

Effectiveness of walking in the management of NSCLBP has been reported by previous studies [41, 42, 50]. Two of these studies were carried out among chronic low back pain patients with failed surgical operations

Table 2 Pre- and post-intervention scores of pain intensity. Functional limitation and fear-avoidance behaviours among the participants

Groups	TWAB Mean (±SD)	TWW Mean (±SD)	Usual care Mean (±SD)	*F* value	*P* value
Pain intensity scores (s)					
Pre-intervention	58.8±20.46	52.08±22.4	63.75±16.01	1.224	0.307
Post-intervention	35.00±25.49	24.17±16.49	47.5± 23.40	3.340	0.048*
t value	6.250	4.185	2.751		
p value	0.0001*	0.002*	0.019*		
Functional limitation scores (s)					
Pre-intervention	24.0±10.03	20.83±10.38)	31.6±10.17	3.235	0.52
Post-intervention	13.9±6.61	7.00±5.97	27.3±13.72	4.369	0.001*
t value	3.921	3.802	0.889		
P value	0.002*	0.003*	0.393		
Fear-avoidance belief scores (s)					
Pre-intervention	61.08±13.04	54.00±25.07	60.75±18.53	0.503	0.609
Post-intervention	45.42±18.81	30.83±17.90	58.16±17.26	6.923	.003*
t value	3.389	3.767	0.829		
p value	0.006*	0.003*	0.425		

*Significant below

The pre-intervention scores of pain intensity. Functional disability and fear-avoidance did not differ significantly among the 3 groups ($P > 0.05$). Reduction in post-intervention pain intensity functional limitation was recorded by the 3 groups. The usual care group did not show improvements in the Fear-avoidance behaviour (58.16±17.26, $p = 0.425$) scores which were recorded by the TWW and TWAB groups The greatest improvement in terms of reduction in pain intensity (24.17±16.49), functional limitation (7.00±5.97) and fear-avoidance (30.83±17.90) were recorded by TWW group while the least improvements in pain functional limitation and fear-avoidance were recorded by the usual care group (Table 2) ($P < 0.05$)

Table 3 Post hoc analysis of the effects of intervention on pain intensity, functional limitation and fear-avoidance among participants (LSD)

Post-intervention pain intensity				
Groups		TWAB	TWW	UC
	(Mean±SD)	35.0±25.49	24.17±16.49	47.50±23.40
TWAB	35.0±25.49	–		*P*=0.017*
TWW	24.17±16.49	*P* = 0.239	–	
UC	47.50±23.40		*P*=0.014*	–
Post-intervention functional limitation				
Groups		TWAB	TWW	UC
	(Mean±SD)	13.9±6.61	7.00±5.97	27.3±13.72
TWAB	13.9±6.61	–		*P*=0.001*
TWW	7.00±5.97	*P*=0.82	–	
UC	27.3±13.72		*P*=0.001*	–
Post-intervention fear-avoidance				
Groups		TWAB	TWW	UC
	(Mean±SD)	45.42±18.81	30.83±17.90	58.16±17.26
TWAB	45.42±18.81	–		*P*=0.009*
TWW	30.83±17.90	*P*=0.056*	–	
UC	58.16 (17.26)		*P*=0.001*	–

GRP A treadmill walk with abdominal bracing, *GRP B* treadmill walk without abdominal bracing, *GRP C* usual care, *SD* standard deviation

*Significant

[41, 42]. However, it could be possible the pain generating mechanisms in failed surficial low back patients will not be the same in patients with NSCLBP; thus, findings from this study lack generalizability to the population of NSCLBP. The other study compares the effects of core muscle activation exercise alone with general endurance exercise in the form of treadmill walk and reported a better effect for treadmill walks [50]. In both studies, each of the treadmill walk and core muscle exercises was carried out as a single and stand-alone exercise. In the present study, we compare among the effects of each of treadmill walk alone, treadmill walk with abdominal bracing and usual care

It seems that there is a dearth of studies that have employed the use of combined core activation technique with treadmill walk carried out concurrently as a single intervention, a previous study that demonstrated the feasibility of carrying out core abdominal bracing and treadmill walk as a combined intervention among apparently healthy individuals [51] we anticipated better reduction in pain. functional limitation and fear-avoidance in the group that carried out treadmill walk with abdominal bracing as a combined intervention partly due to the reinforcement of effects of core muscle activation and treadmill walk as opined in one of the previous studies [41, 42] and partly due to an anticipation that core muscle activation incorporated

into treadmill walk, i.e. activation and control of trunk muscles while carrying out walking and other functional activities will lead to a better postural control and reduced activity limitation. However, the lack of superior effects in the treadmill walk with abdominal bracing might be due to the demands of activating core muscles and maintaining correct posture while doing a treadmill walk. Core muscle activation involves a higher level of motivation and thus, it could be that if the participants were further educated verbally and perhaps with the use of audiovisuals on how to correctly activate and maintain abdominal and bracing while undergoing treadmill walk and if the intervention were carried out for a longer period than 6-week. The findings from the core muscle activation with the treadmill walk group might be different.

Reported benefits of Walking among patients with LBP include improvement in the strength of the back muscles and flexıbılıty of movement as well as improved counter-rotation between the thorax and pelvis. The improvement recorded by the treadmill walk and abdominal bracing could be attributed to the reported effects of core muscle activation which include an improved pattern of activation in the core muscles of the spine [42].

It could thus be concluded that treadmill walk with and without abdominal bracing as well as usual care is effective in the rehabilitation of patients with NSCLBP. The use of a treadmill walk combined with abdominal bracing did not produce a better effect than the treadmill without abdominal bracing.

Limitation

The outcome measure used in this study could have been better reported using standardized instrumented outcome measures such as electromyography or real-time ultrasound to monitor abdominal muscle contraction during abdominal bracing, this could not be done due to non-availability and affordability.

Conclusion

Based on the findings of this study, it can be concluded that facilitated core activation using the abdominal bracing technique with treadmill walk is effective in reducing pain intensity, fear –avoidance and improving the functional status of patients with low back pain.

Author contributions

Olowe Olajide O: Concept; Design; Definition of Intellectual content: Literature search; Clinical studies; Experimental studies; Data Acquisitions: Data analysis; Statistical analysis; Manuscript Preparation; Manuscript Editing; Manuscript Review; Guarantor, Sokunbi Ganiyu O: Concept; Design; Definition of Intellectual content; Literature search; Data Acquisitions; Data analysis; Statistical analysis; Manuscript Preparation; Manuscript Editing; Manuscript Review; Guarantor; Salisu Abdulrafiq; Concept; Design; Definition of Intellectual content; Manuscript Preparation; Manuscript Editing; Manuscript Review; Guarantor; Okafor Anita: Concept; Design; Definition of Intellectual content; Data Acquisitions; Data analysis. The author(s) read and approved the final manuscript.

Declarations

Competing interests

The authors declare that they have no competing interests.

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