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ORIGINAL ARTICLE

EFFECT OF PLANK EXERCISE AND DEAD BUG EXERCISE AMONG PATIENTS WITH LOW BACK PAIN

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ABSTRACT

Background of the Study: Lower back pain is menace of today's worlds influencing about 80 % of the population is affected from low back pain at least once or twice in their life span. Dead bug exercise is effective exercise for promoting stabilization of trunk and pelvis. The study to compare the effect of plank exercise and Dead bug exercise to reduce the low back pain. Aim of the study is to find the Comparative the effect of plank exercise versus dead bug exercise among patients with low back pain. **Methodology:** This is an experimental comparative type study with 30 subjects conducted at ACS Medical College and Hospital, Chennai for five weeks. The subjects selected for the study got consent for participation, the subjects were selected based on inclusion and exclusion criteria, they were assigned into 2 groups, 15 in each group for a duration of 3 days per week for 5week, age group between 18-30 years with low back pain more than 2 weeks were included in study. Group A with plank exercise and group B with Dead bug exercise. Pain and function were measured by visual analogue scale and Oswestry disability index. **Result:** On comparing pre-test and Post-test within Group A & Group B on Visual analogue scale and ODI scale score shows highly significant difference in Mean values at $P \leq 0.001$. Group A shows higher effect than the group B. **Conclusion:** In our study we found that plank exercise had a significant difference in decreasing a low back pain concluded that plank exercise improves body alignment, flexibility, metabolism, build core strength, balance and coordination

Keywords: Plank exercise; Dead bug exercise; Low back Pain; Core stability

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INTRODUCTION

Low back pain is described as some of the discomfort, uneasiness in back that could cause pain, muscle tension, stiffness in local area which can be Radiating or non-radiating into the lower limbs.

Lower back pain is risk of today's worlds influencing about 80 % of the population is affected from LBP (Low Back Pain) at least once or twice in their lifetime. Leading causes of LBP include having incorrect posture while standing sitting, and lifting of heavy weights. low Back pain is one of the common most problems of entire world¹⁻⁴.

Chronic low back pain (CLBP) causes morphological changes in muscles, reduces muscle strength, endurance and flexibility, negatively affects lumbar stability, and limits functional activity⁵⁻⁹.

deep core muscles: 1st group of muscles which are primary stabilizing muscles. muscles which are includes in this are transverse abdominals, lumbar multifidus, internal oblique muscle and quadrates lumborum. the muscle lumbar multifidus is attached directly to every lumbar vertebra¹⁰.

shallow core muscles the 2nd group of muscle. consists of global a stabilizing muscle which includes muscles like rectus abdominis, internal and external oblique mus., erector spinae, quad. lumborum, they are indirectly attached to vertebrae instead linked to the pelvis to the thoracic ribs or lower limb joints therefore enhancing the spinal control¹¹.

Dead bug exercise: Dead bug exercise is considered as effective exercise for promoting stabilization of trunk and pelvis. Its performance

involves alternately moving arms and legs in supine lying. this activates the erector spinae, multifidus, rectus abdominis, oblique muscles it is used to train stability & control around trunk region. focusing on core musculature & hip adductors muscle groups¹².

Dead bug exercise has confirmed that muscle activity of abdominal muscles was enhanced by performing the Dead bug exercise for trunk stability at higher speed⁵. Dead bug exercise can be used to increase abdominal muscles activity to promote trunk stability by using different exercise methods and various speeds¹³.

DEAD BUG EXERCISE IS considered it is also classified into static holds and slow movements in a stable environment and characterized by static isometric contraction with controlled simultaneous limb movements. Dead bug as an isometric exercise challenges the core through braced positions, which may reduce the risk of injury, and eliminates excessive or undesirable movements while focusing more on spinal stability¹³.

the dead-bug exercise where the arms and legs are alternately crossed while in a supine position these exercise methods enhances the abdominal muscles which are important for providing trunk stabilization during trunk and upper extremity movements, and are effective in promoting overall function .of these exercises, the dead-bug exercise is an effective exercise for promoting stabilization of the trunk and pelvis and is performed by alternately moving the arms and legs while maintaining the abdominal draw-in maneuver, which activates the rectus abdominis and oblique muscles¹⁴.

This exercise can enhance strength & endurance in muscle of core. Which are essential for

providing trunk stabilization & effective in providing proper lumbopelvic functioning during motor skills¹⁵.

Plank exercise which acts as strengthening the core muscles as transverse abdominis, multifidus, diaphragm, and pelvic floor muscles by effectively contracting these muscles in performing exercise can also be one of reason for reduction in pain & improvement in disability^{16,17}.

Aim Of the Study: The aim of the study is to compare the effect of plank and Dead bug exercise among patients with low back pain.

METHODOLOGY

Study design is experimental, type is comparative, Study settings done at OPD, ACS Medical College and hospital, Chennai. Sample size of 30 samples of total patients with low back pain group a (15), group B (15). Randomly samples were allocated in to two group. The study conducted for a duration of 5 weeks and treatment given for 3 days per week.

Inclusion Criteria

- Age: 18- 30 years of age
- Gender: male and female
- Low back pain more than 2 weeks
- Subjects with low back pain (chronic)

Exclusion Criteria:

- History of abdominal surgeries
- History of spinal surgeries
- Hip knee dysfunction
- Pregnancy
- Any systemic diseases as arthritis, TB, liver, kidney failure.
- Any recent fracture in hand and legs

Materials required:

- Consent form
- Visual Analog Scale (VAS)
- Stop watch
- Exercise mat

Pain and function are the outcome measures used in this study

Pain and function are the dependent variables

Plank exercise and Deadbug exercise are the independent variables

Visual Analog Scale and Oswestry Disability Index scale are the measurement tools

Procedure: A total of 30 subjects were divided into 2 groups. Group A was treated with plank exercise. and Group B was treated with Deadbug exercise for 3 days per week for 5 weeks. The study was conducted at the ACS medical college and hospital OPD. The subjects in the Group A were given plank exercise for 40 sec with 1min of rest for 2 sets for 3 days per week for 5 weeks. Group B were given Deadbug exercise for 40 sec with 1 min of rest for 2 sets for 3 days per week. Pre and Post test values are recorded. This study utilized a pre-test and post-test experimental research design. to compare the effect of Dead bug and plank exercise. Participants completed a 5 weeks core exercise training program Participants did not engage in any other core specific exercise during 5 weeks of this study.

Group A

Plank Exercise: Based on inclusion and exclusion criteria, after taking written consent form the participants attended 2 sessions during session 1 pre reading were taken and participants were introduced with 3 plank exercise to ensure that they could perform all activities using a proper posture or instructed to do all plank activities at homes for 5 weeks after 5 weeks ie., post

reading were taken to find out difference between the plank and Deadbug exercise.

1.Prone on elbow plank: in this position both forearms kept up contact with ground while hands made clench hands and the elbow kept up a separation of 30 cm separated. protraction of scapula and keep up 90degree points at lower legs



Figure:1. Prone on elbow plank

2. Side Plank: Sideling with Patient Elbow Beneath Him. Ascend So Body Is Resting One Lower Arm /Elbow and Foot on Same Side.



Figure:2. Side Plank

3.quadrapped opposite arm / Leg: in Quadruped position with knees bowed to 90 degree and hand on tangle head straight, tighten the

hamstrings, gluteus and low back and lifting to rectify the leg and inverse arm.



Figure:3. Quadruped Opposite Arm / Leg

Group B

Dead bug Exercise: Dead bug exercise started with participant in supine, lying on a mat with shoulders, hip joint and knees flexed to 90 with lumbopelvic region being maintained in the neutral position, the participants was then instructed to draw in abdomen, lower two contralateral limbs (opposite arm and leg) toward the floor, 40 sec then return to starting point. The same movement was repeated with opposite limbs in Dead bug exercise both pairs of limbs were moved at equal number of times at stimulated time.

- Upper Extremity Deadbug Exercise
- Lower Extremity Deadbug Exercise
- Upper And Lower Extremity Deadbug Exercise

1.Upper Extremity Deadbug Exercise: Starting position for the first Deadbug exercise method included only upper extremities with shoulder flexed to 90 degrees and with knees straight up while lying in supine

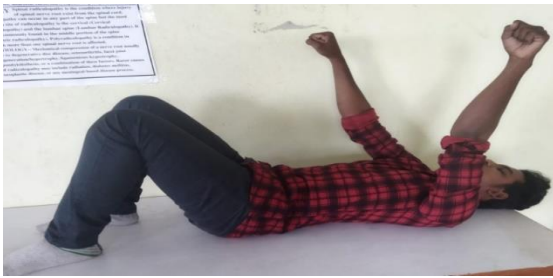


Figure :4. Upper Extremity Deadbug Exercise

2. Lower extremities Deadbug exercise:

Starting position for second Deadbug exercise method included only the lower extremities laid onto the ground and with hip joint and knee joints in 90degree flexion.



Figure :5. Lower Extremities Deadbug Exercise

3. Upper and lower extremities Deadbug exercise:

The starting position for the third dead-bug exercise method included movement of both the upper and lower extremities with the shoulders hip joint and knees flexed to 90 degrees, while supine lying.



Figure 6: Upper and Lower Extremities Deadbug Exercise

Data Analysis: The collected data were tabulated and analysed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24, with a significance level of p value less than 0.05 and a 95% confidence interval set for all analysis. The Shapiro Wilk test was used to determine the normality of the data. In this study, Shapiro Wilk test showed that the data was normally distributed on the dependent values of NRS (significance 0.237), UDI - 6 (significance 0.364) & POPDI - 6 (significance 0.531) at $P > 0.05$. Hence parametric test was adopted. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups.

Group A	TEST	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig. Diff. (P < 0.05)
VAS	Pre Test	8.133	15	4.40	0.986	14	17.29	<0.0001	****
	Post Test	3.733	15		0.255				
ODI	Pre Test	72.40	15	41.07	6.319 1.631	14	25.17	<0.0001	****

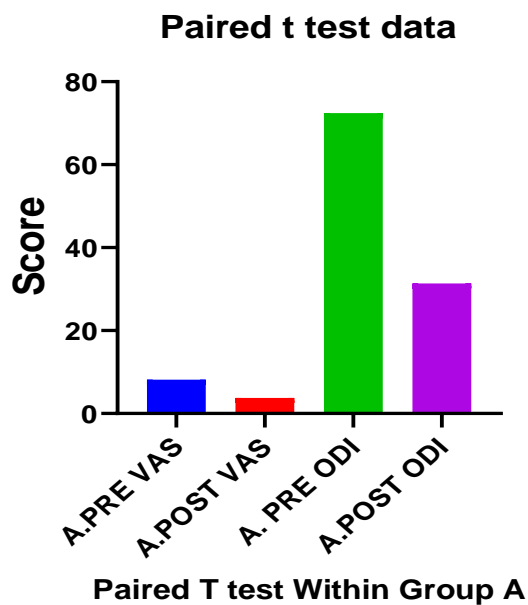
Table 1: Paired T Test Within the Group A on Vas And ODI

The above table 1 shows significant difference in Paired t test within the Group A on VAS and ODI with P value >0.0001

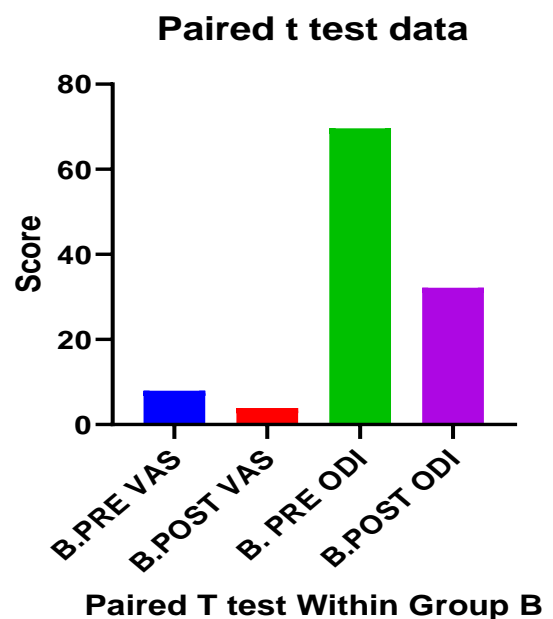
Group B	TEST	Mean	Number of Pairs	Mean Diff.	SD, SEM	df	t	P value	Sig. Diff. (P < 0.05)
VAS	Pre Test	7.933	15	4.067	1.223	14	12.88	<0.0001	****
	Post Test	3.867	15		0.3157				
ODI	Pre Test	69.60	15	37.47	7.269 1.877	14	19.96	<0.0001	****

Table 2: Paired T Test Within the Group B On Vas And ODI

The above table 2 shows significant difference in Paired t test within the Group A on VAS and ODI with P value >0.0001



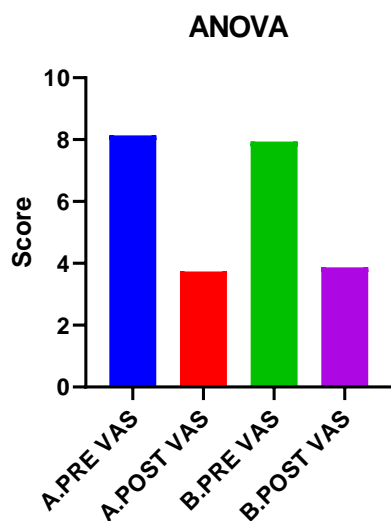
Graph 1: Presentation of Vas and ODI Within the Group A



Graph 2: Presentation of VAS and ODI Within the Group B

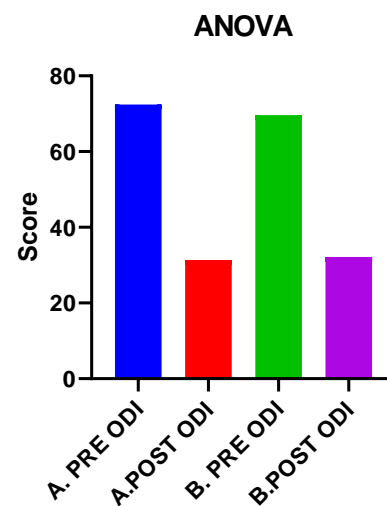
Out come Measures	Exercise	Test	Mean	Mean Diff.	R Square	F	P value	Sig. diff. (P < 0.05)
VAS	Group A	Pre test	8.133	4.40	0.8840	142.2	<0.0001	****
		Post Test	3.733					
	Group B	Pre test	7.933	4.067				
		Post Test	3.867					
ODI	Group A	Pre test	72.40	41.07	0.9284	242.1	<0.0001	****
		Post Test	31.33					
	Group B	Pre test	69.60	37.47				
		Post Test	32.13					

Table 3: ANOVA Between Group A And B on Vas And ODI



Comparative test between Group A and B

Graph 3: Presentation of ANOVA Between Group A And B On VAS



Comparative test between Group A and B

Graph 4: Presentation of ANOVA Between Group A And B On ODI

RESULTS

A total of 30 subjects were divided into 2 groups of each group has 15 Participants. Group A was treated with plank exercise. and Group B was treated with Dead bug exercise.

participants with LBA included in the study based on specific

selection criteria. Participants were both genders with age group between 18 to 30 years. This study utilized a pre-test and post-

test experimental research design. to compare the effect of Dead bug and plank exercise.

In Group A, VAS and ODI improved significantly with mean difference of 4.40 and 41.07 respectively with P value>0.0001

In Group B, VAS and ODI improved significantly with mean difference of 4.067 and 37.47 respectively, with P value>0.0001

Comparative study between Group A and Group B showed significant difference in VAS and ODI with F value 142.2 and 242.1 respectively with P value>0.0001.

The study concluded that Group A is more effective than Group B with mean difference of 4.40 and 41.07 respectively in VAS and ODI.

DISCUSSION

This study was to find out the effects of plank exercise and Deadbug exercise among patients with low back pain Advantages of plank and Deadbug exercise improves body alignment flexibility, metabolism, build core strength, balance and coordination. This current study was to find which (plank and Deadbug exercise) is more effective in relief and reduce in back pain.

Dead Bug exercise is considered as effective exercise for promoting stabilization of trunk and pelvis. its performance involves alternately moving arms and legs in supine lying. This activates the erector spinae, multifidus, rectus abdominis, oblique muscles. it is used to train stability & control around trunk region. focusing on core musculature & hip adductors muscle groups ^{20, 21}.

This exercise can enhance strength & endurance in muscle of core. Which are essential for providing trunk stabilization & effective in providing proper lumbopelvic functioning during motor skills ²⁴.

plank can help in improve posture by strengthening the back, chest, shoulder, neck, abs this exercise makes it easier to keep shoulder back and lower back in neutral position ^{25,26}.

Plank exercise which acts as strengthening the core muscles as transverse abdominis, multifidus, diaphragm, and pelvic floor muscles by effectively contracting these muscles in performing exercise can also be one of reason for reduction in pain & improvement in disability ¹⁸.

comparison of Dead bug exercise and abdominal draw-in exercise on the activities of lumbar extensor muscles and the pelvic angle during prone hip extension in women with weak abdominal muscles: we suggest that ADIE and DBE are effective for women with weak abdominal muscles In the DBE group, the muscle activity of GM was significantly increased after the intervention ($p<0.05$). However, there was no significant difference between the two groups in the amount of increase in the activity of GM ($p>0.05$).

Moreover, in both groups, the activity of ES and the pelvic anterior tilt angle decreased significantly after the intervention ($p<0.05$) The decreased quantity in the pelvic anterior tilt angle and in the activity of ES showed no difference between the two groups ($p>0.05$). In the activity of ST, there was no significant difference within and between the two groups ($p>0.05$)¹⁹.

comparison of trunk muscle activity between traditional plank exercise and plank exercise with isometric contraction of ankle muscles in subjects with chronic low back pain : the activities of all abdominal muscle during plankdf were significantly higher than those during the traditional plank, as well as during the plank with isometric contraction of ankle plantar flexor The activities of all abdominal muscles during Plank were significantly higher than those during the traditional plank, as well as during the plank with isometric contraction of ankle plantar flexor (Plank) and the plank without ankle muscular contraction (Plank), and more than 60% of maximal voluntary isometric contraction was observed. Thus, Plank could be applied not only as a rehabilitation strategy for patients with decreased core stability owing to weakness of abdominal muscles but also as fitness program for improving core strength⁸.

Trunk muscles EMG during intermediate Pilates mat exercises in beginner healthy and chronic low back pain individuals the Pilates exercises presented different muscle recruitment patterns, and allowed the activation of the lumbopelvic stabilizing muscles even in the first session for healthy individuals and those with chronic low back pain The criss-cross exercise presented the highest values of root mean square for trunk flexors (rectus abdominis and oblique) compared with the other exercises, followed by the single leg stretch and the dead bug, which had similar muscle activation. The single leg stretch presented more activation of the rectus abdominis and oblique, whereas the criss-cross and dead bug created more activation of the oblique compared with the multifidus and rectus²³.

In this study, we confirmed that the activity of

the abdominal muscles was significantly increased during the plank operation in the state where the Kinesio tape was attached. In addition, it was confirmed that the activity of the abdominal muscles was significantly increased during the plank operation on the unstable surface. These results suggest that in the state of Kinesio tape attached and instability, plank motion has a positive effect on abdominal muscle activity²⁷.

The results of this study were as follows: 1. All muscles showed an interaction between training period and group. 2. There was a significant difference between the groups at the 2 weeks and 4 weeks of the internal oblique and transverse abdominis muscle measurements. Conclusion that the thickness of the abdominal muscle increased during the side plank exercise according to the support surface, and the thickness of the abdominal muscle increased the most during the side plank exercise on the unstable support surface. Therefore, it is thought that the addition of an unstable support surface will provide a more effective therapeutic effect on the thickness change of the abdominal muscle during side plank exercise²².

The seven included studies differed greatly with respect to the applied methods, the chosen interventions and the obtained results. Furthermore, core muscles were never trained separately but were always part of a program containing other preventive elements. Therefore, it was difficult to compare the studies. However, prevention programs including strengthening exercises for core muscles tend to positively affect the injury rate. Based on the literature found, the research question cannot definitively be answered. In the future, further studies are needed which

investigate the effect of isolated core muscle training on the injury rate of soccer players²⁷.

These results show that elbow plank exercise can improve all factors of physical fitness and improve some of the immunocyte functions of a middle-aged man. This study confirmed that, although the elbow plank exercise of vigorous intensity for 4 weeks improved physical fitness, it was not effective in improving some immunocyte functions. Therefore, the exercise intensity of plank exercises for improving immunocyte functions should be reconsidered²⁸.

The trunk and hip muscles activations were generally significantly higher level during three SSP than SHA. SSP-M showed significantly lower EO activation while significantly higher ES and LM activation than SSP-L. GMED activation was significantly higher during SSP-M than during SSP-L. TFL activation was significantly lower during SSP-M than during SSP-N and SSP-SSP could be prescribed for patients who have reduced GMED strength after injuries. Especially, SSP-M could be applied for patients who have GMED weakness with dominant TFL²⁹.

this study is aimed to find out the effects of plank exercise and dead Bug exercise among patients with low back pain. In this there are 30 subjects were included with the age group between 18-30 years are taken. One group were received plank exercise and other group were received Deadbug exercise

In Group A, VAS and ODI improved significantly with mean difference of 4.40 and 41.07 respectively with P value>0.000. In Group B, VAS and ODI improved significantly with mean difference of 4.067 and 37.47 respectively, with P value>0.0001

Comparative study between Group A and Group B showed significant difference in VAS and ODI with F value 142.2 and 242.1 respectively with P value>0.0001.

The study concluded that Group A is more effective than Group B with mean difference of 4.40 and 41.07 respectively in VAS and ODI.

Ethical Clearance: Ethical clearance has obtained from Faculty of Physiotherapy, Dr. MGR. Educational and Research Institute, Chennai, Tamil Nadu, Reference number: No: E-22/PHYSIO/IRB/2021-2022, Dated: 29/01/2022.

Conflict of interest: There was no conflict of interest to conduct this study.

Fund for the study: It was a self-financed study.

CONCLUSION

The study conclude that plank exercise was best in treating patients with low back pain which act as strengthening the core muscles as transverse abdominis, multifidus, diaphragm, and pelvic floor muscles by effectively contracting these muscles in performing exercise can also be one of reason for reduction in pain & improvement in disability.

On comparing two groups group A shows a marked improvement in functional activity and also reducing low back pain in subjects.

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