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Efficacy of Core Stability Exercise on Physio Ball Versus Trunk Balance Exercise in Non-Specific Low Back Pain

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ABSTRACT

Background: Low back pain has found to be most common cause of disability in developing countries. Approximately two third of the adults are affected by non-specific low back pain or mechanical low back pain at some point in their lives. The endeavour of this study was to compare the efficacy of the core stability exercise on Physio ball and trunk balance exercises in terms of pain, disability and quality of life in individuals with non-specific chronic low back pain.
Material and Methods: Thirty male subjects were included in the study divided into two groups (15 subjects in each group). The group-A received core stability exercise on physio ball and group-B received the trunk balance exercise. The protocol consisted of eight sessions 4 times a week for two weeks and the readings was taken on first session (pre-intervention), fourth and eighth (post-intervention) on VAS for pain, Oswestry Disability Index for disability and quality of life.
Results: Trunk balance exercise (Group-B) showed statistically significant difference in pain (VAS3) and disability (ODI3) as compared to the core stability exercise on the Physio ball (Group-A) after 8 sessions of intervention in individuals with non-specific chronic low back pain.
Conclusion: From the study, we conclude that the both group-A and group-B when combined with hot pack and flexibility exercises shows statistically significant improvement in pain, disability and quality of life. However, group-B was more effective than group-A in treating non-specific chronic low back pain.

Keywords: Low back pain, Oswestry Disability Index, trunk balance exercises, core stability exercise, Physio ball.

INTRODUCTION

The incidence of back pain regains the highest score among the low back pain population (Andrew *et al*., 2002). Low back pain has found to be most common cause of disability in developing countries. The lifetime prevalence of low back pain is reported up to 85% and seems to be highest in the physically active years (in people aged 25–45) (Perina *et al*., 2009). Back pain is most common among men and women between the ages of 25-45 (Ng et al., 2018). Furthermore, the economic, social, and public health effect of LBP appear to be increasing. LBP occurs billions of dollars in medical expenditure each year (Andrew *et al*., 2002 and Perina *et al*., 2009). Approximately two third of the adults are affected by non-specific low back pain or mechanical low back pain at some point in their lives (Perina *et al*., 2009). Studies show that back pain in the adolescent population has become increasingly common (Jeffries *et al*., 2007). Sedentary

lifestyle is further worsens LBP (Thomas *et al*., 2004). Majority of the acute low back pain disorders resolve within a 4-week period and a small number (10-40%) become chronic. Chronic low back pain is pain and disability that persists for more than three months (Sullivan P 2005). Chronic low back pain reduces muscle strength, endurance, flexibility and balance (Ferreira *et al*., 2007). Many previous studies have investigated chronic back pain and have described the main cause of back dysfunction and pain as the weakening of the abdominal muscles (Hodges *et al*., 2011). Progression of back pain for months causes restriction of the movement of the body and the muscles atrophy. In chronic cases, the cross-sectional area of the muscle around the vertebral bodies Decreased, leading to deterioration of back pain, secondary damage, and recurrence (Danneels *et al*., 2001).

- Trunk balance exercises are balance exercises focusing on restoring balance by targeting the feedback control mechanism (Gatti *et al.*, 2011). The Physio ball is a conservative treatment option for back pain sufferers and has been designed to help prevent further episodes of low back pain as part of a rehabilitation programme (Raphael *et al*., 2006). The current study aimed to compare the efficacy of the core stability exercise on Physio ball and trunk balance exercises in terms of pain, disability and quality of life in individuals with non-specific chronic low back pain (CLBP).

MATERIALS & METHODS

The Convenient sampling method used for subject selection for the study. Thirty male subjects of 25-45 years age were included in the study divided into two groups (15 subjects in each group). The group-A received core stability exercise on physio ball and group-B received the trunk balance exercise. The protocol consisted of eight sessions 4 times a week for two weeks and the readings was taken on first session (pre-intervention), fourth and eighth (post-intervention) on VAS for pain, Oswestry Disability Index for disability and quality of life. Patient with low back pain from at least 3months and disability score less than 40% on Oswestry disability index were taken using convenient sampling. After the initial examination, the subjects were assessed for pain using VAS.

Intervention given to the subjects

Group A and B will receive 10 min of hot pack then 10 min of flexibility exercise for spine.

- Flexibility exercises: Cat camel exercise and Double knee-to-chest exercise with the assistance of both hands.

Group - A (Core stability exercises): Abdominal crunches- Subject in supine position with lower back supported on the ball and hands were clasped behind the head. Subject feet were shoulder width apart. Drawn lower abdominal muscles towards the spine. Subject slowly flexed the spine while keeping abdominal muscles draw in and returned to starting position. Repetition had been done for 10 times. Bridging with head on ball- Subject's shoulder blades were aligned at the top and middle of the ball with arms across chest. Feet were placed on the ground shoulder width apart; and thighs parallel with the ground. Abdominal muscles drawn in, glutes and hamstrings engaged to maintain straight line from neck to knees. Subjects maintained this position for 3- 5 sec. Then slowly relaxed and repeat 10 times. Supine bridging- Subject in supine position with arms out to the side and feet on the ball toes pointed forward. Abdominal muscles drawn in towards the spine. Repetitions 10 times done. Russian twist with medicine ball on Physio ball- Subject seated on Physio ball with feet planted, medicine ball held out in front, and abdominal muscles drawn in and maintained while twisting body side to side. Repetitions done 10 times.

Group - B (Trunk balance exercise): Subjects had performed 20 minutes of trunk balance exercises. Type I. Subject kneeling

on a pillow and arms abducted to 90^0, rotated the trunk, head and upper limb to one direction. Subject had repeated the same two times per direction, maintaining each position for 30 sec. The exercise was made more challenging by adding first eye closure and then head extension. Type II. Subject kneeling on a pillow, moved the upper limbs in flexion and extension, with a simultaneous movement of the head. The position was maintained for 2 minutes while performing four repetitions of upper limb movement. The exercise was made more challenging by adding eye closure. Type III. Subject in supine with feet resting on the table, lifting the pelvis up, after reaching maximum hip extension, subject raised one lower limb from the table and extended the knee. This position was maintained twice for 30 sec for each lower extremity. The exercise was made more challenging by adding first eye closure and then a pillow under the foot resting on the bed. Type IV. Subject from the quadruped position extended opposite upper limb. The position was maintained for 1 min for each combination of limbs. The exercise was made more challenging by adding eye closure first and then a pillow under the lower limb.

Anthropometric measurements: height, weight and BMI measured by standard universal methods.

STATISTICAL ANALYSIS

Standard descriptive statistics (mean ± standard deviation) were determined for directly measured variables. The independent t-test was used for the comparison of selected variables between subjects of Group-A and B. Data were analysed using SPSS (Statistical Package for Social Science) version 21. A 5% level of probability was used to indicate statistical significance.

RESULT

Table 1. showed the descriptive statistics of anthropometric variables and outcomes measure variables in non-specific chronic low back pain between group A and B. Group A have higher mean value in age (34.80year), weight (77.40kg), BMI (27.10 kg/m2). However, non-significant differences (p>0.035) were found in Age (t= 0.30) Height (t=1.660), Weight (t=0.677), BMI (t=2.211).

Variables	GROUP A		GROUP B		t value	p value
	MEAN	SD	MEAN	SD		
Age(years)	34.80	6.213	34.73	6.135	0.30	.977
Height(cm)	168.60	4.968	171.80	5.570	1.660	.108
Weight(kg)	77.40	10.294	74.60	12.281	0.677	.504
BMI	27.10	2.214	25.133	2.639	2.211	.035

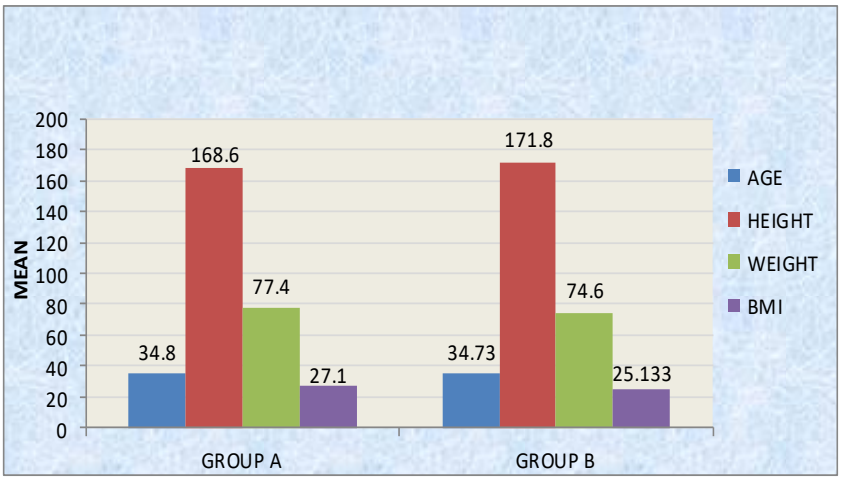


Table 2. showed the comparison of VAS (Visual Analogue Scale) variables in non-specific chronic low back pain. Group A and group B have same VAS1 mean value (5.07), Group B have less VAS2 (2.53) than group A (2.80), similarly Group B have less mean value VAS3 (0.73) than group A VAS3 (1.60). However, significant differences (p<.021) were found in VAS3 (t=2.438) in group A and group B.

Variables	GROUP A		GROUP B		t value	p value
	MEAN	SD	MEAN	SD		
VAS1	5.07	0.884	5.07	.884	0.000	1.00
VAS2	2.80	1.146	2.53	.915	0.704	.487
VAS3	1.60	1.183	0.73	.704	2.438	.021

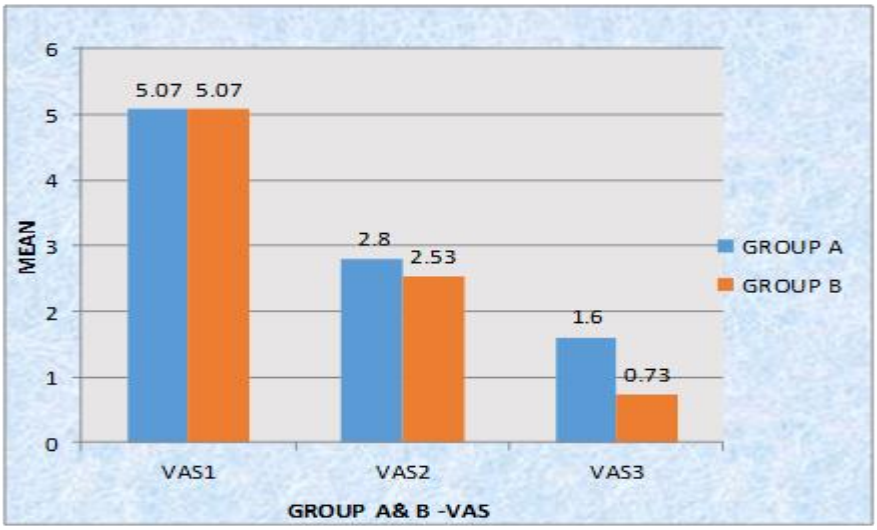


Table 3. showed the descriptive statistics of ODI (Oswestry Disability Index) variables in non-specific chronic low back pain. Group B have higher ODI 1 mean value (71.66) than group A (68.833). Group B have less ODI2 (46.880) than group A (50.573). Similarly Group B have less mean value ODI3 (29.586) than group A ODI3 (35.220). However, significant differences (p<0.002) were found in ODI3 (t=3.337) of group A and B.

Variables	GROUP A		GROUP B		t value	p value
	MEAN	SD	MEAN	SD		
ODI1	68.833	6.655	71.766	5.224	-1.343	0.190
ODI2	50.573	5.574	46.880	5.885	1.764	0.089
ODI3	35.220	4.285	29.586	4.938	3.337	0.002

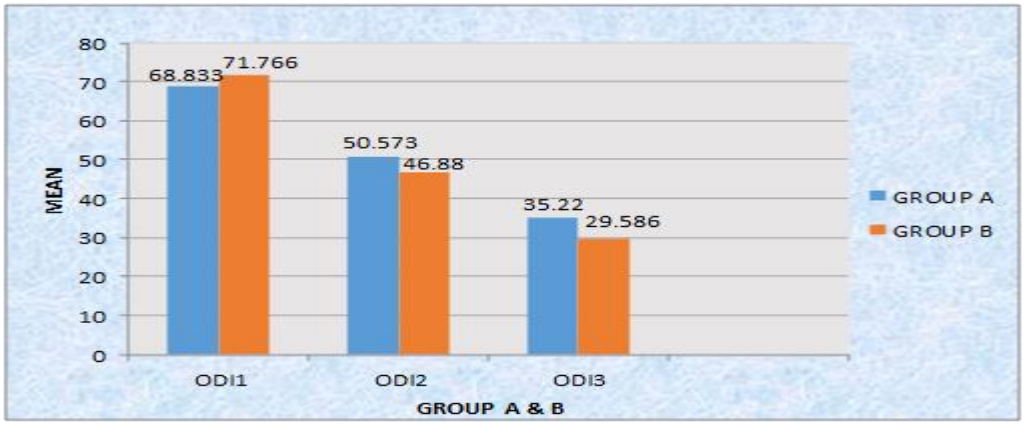
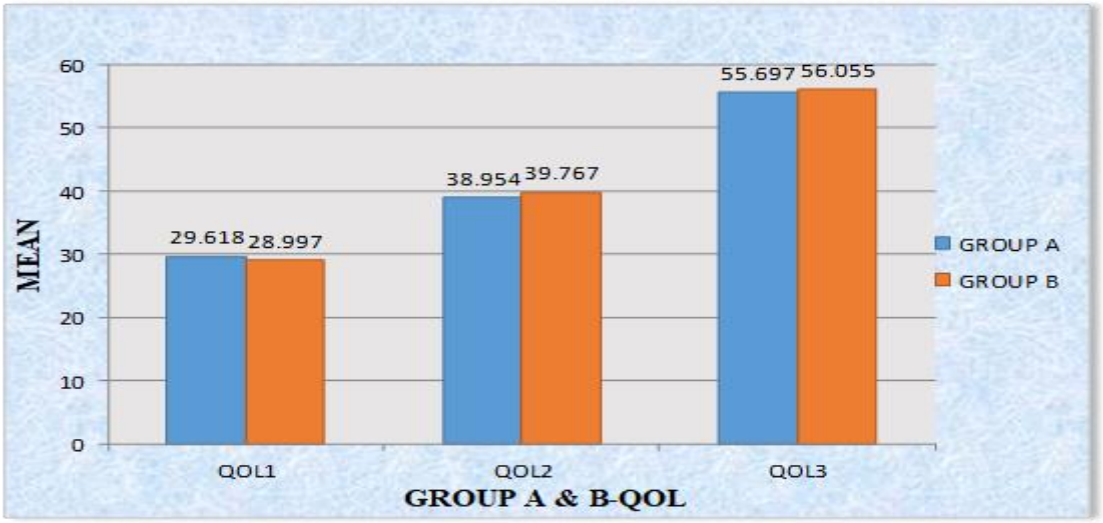


Table 4. showed the comparison of mean and SD values of QOL (Quality of Life) between group A and B. Statistically non-significant difference (p value>0.001) was found with QOL3 (t=0.451) between group A and B.

Variables	GROUP A		GROUP B		t value	p value
	MEAN	SD	MEAN	SD		
QOL1	29.618	2.776	28.997	2.508	.643	.526
QOL2	38.954	3.925	39.767	3.981	-.563	.578
QOL3	55.697	2.049	56.055	2.300	-.451	.656



DISCUSSION

In the present study within group analysis of both the groups showed statistically significant improvement in pain, disability and quality of life in non-specific chronic low back pain patients. For between group analyses, both groups showed statistically non-significant results in pain, disability and quality of life but trunk balance exercises showed statistically significant results in VAS, ODI and QOL as compared to core stability exercises.

The finding of Gatti et al (2011) showed that trunk balance exercises reduce disability and led to improvement in function and quality of life in patients with chronic low back pain. In the previous study (Marshall and Bernadette, 2004) concluded that the Swiss ball provided a training stimulus for rectus abdominis, the relevance of this change to core stability training required further research because the focus of stabilization training was on minimizing rectus abdominis activity. Our findings are similar with the findings of Khan and Shamsi et al (2013) who concluded that the addition of heating modalities along with exercise therapy, improves the symptoms of chronic low back pain.

CONCLUSION

In conclusion, the researchers recommend further research with more sample size, control group and follow up of the interventions.

Declaration by Authors

Ethical Approval: Approved

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Conflict of Interest: The authors declare no conflict of interest.

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