



ORIGINAL RESEARCH PAPER

Physiotherapy & Rehabilitation

TO COMPARE THE EFFECT OF PILATES VERSUS CONVENTIONAL TRUNK EXERCISES ON ABDOMINAL STRENGTH AND LUMBOPELVIC FLEXIBILITY IN YOUNG ADULTS.

KEY WORDS: Mat based Pilates, Lumbopelvic flexibility, Abdominal muscle strength, Sit and reach test.

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ABSTRACT

Background: Obtaining an effective rehabilitation program to improve lumbar-pelvic motion control and abdominal strength in patients has always been a concern for physical therapists. Therefore, the purpose of this study was to investigate the effectiveness of Pilates exercises and conventional trunk exercises on lumbar-pelvic flexibility and strength of abdominal muscles in young adults. **Study Design:** Comparative study design **Source of Data Collection:** DAV institute of physiotherapy, Yamunanagar. **Methodology:** 30 healthy young subjects were included in study on the basis of inclusion criteria were randomly allocated into 2 groups: Group A performed mat based Pilates exercises and Group B received Conventional trunk strengthening exercises. Exercises were performed for 4 weeks. Abdominal muscle strength & lumbopelvic flexibility were measured as Outcome measure on 1st, 14th and 28th day using aneroid sphygmomanometer and sit and reach test respectively. **Result:** Statistically significant improvement (p<0.05) noticed in both groups for both the outcomes. However in-between comparison showed that pilates exercises improved the abdominal strength and lumbopelvic flexibility more than with conventional trunk exercises. **Conclusion:** This study provides evidence that the mat based Pilates exercises protocol resulted in superior outcomes than conventional trunk strengthening exercises.

INTRODUCTION

Presently most health problems occurs due to inactivity resulted from advancement in technology, that made our lifestyle more sedentary, changed from manual to mechanical to computerized even more advanced to imaginary.¹ To reduce the risk of health problems there is need to encourage people to indulge in daily physical activity. As the amount of exercise required to maintain and improve health is not utilized by a majority of the population, there is a need to find such exercise modalities that appears easy to perform by the general public and facilitate strength, make a physiological difference, not only make people look attractive, but also improves overall fitness.²

To live a pain free life, it is very important to have strong core. The Strong abdominal muscles play an important role in the movement of trunk and in spine stabilization.³ It also helps to improve endurance during sports and other physical works thus improve the overall fitness of your body.⁴ Therefore, Developing stronger abdominal muscle is very essential for every individual.

Pilates has become a world-wide acceptance as it credits numerous benefits including improved strength, mobility, endurance, flexibility, core stability, proprioception, body control and even a "mind-body" effect in different gravitational planes.⁵

The Pilates method of exercise uses the concept of maintenance of the normal lumbar lordotic curve, called the neutral spine, coupled with movement of the lower and upper extremities to simultaneously enhance mobility through improved flexibility and proximal stability.⁶ However, only a few studies with dancers have been performed that demonstrate a positive impact of Pilates style exercises on function and posture. A systematic review suggests that the mat -based exercises are safer and easier to learn and can provide a better stability to the body.

The available literature shows disagreement with regard to the evidence for Pilates in the treatment of patients with weak core muscle strength, and there are very few studies to date comparing mat Pilates with conventional PT. Therefore, the objective of this study was to compare the effectiveness of Pilates and conventional exercises in order to assist physical therapists in relation to the evidence of the method and clinical decision making.

METHODS

Participants

Study design was Experimental and sampling technique was non-randomized convenient sampling technique. 30 healthy subjects were included in the study on the basis of inclusion criteria and were randomly allocated into 2 groups as Group A and B using computer software program that generates random sequence.

Inclusion Criteria

- Age 18 to 25 years
- Both male and females
- BMI: 18 -29.9 Kg/m²
- Absence of acute or chronic low back injury

Exclusion Criteria

- Any history of major or minor abdominal surgery
- Present or past history of low back pain
- Subjects undergoing regular exercises / yoga / sports
- Presence of any orthopaedic, rheumatologic, neurologic and respiratory disorders

Outcome Measures:

Abdominal strength and lumbopelvic flexibility were measured using Aneroid sphygmomanometer and sit and reach test respectively on 1st, 14th and 28th day.

Study Protocol

Participants performed exercises for four weeks (six sessions per week)

Group A: Subjects performed Mat based Pilates exercise protocol⁵

Exercise begun with Warm up followed by Conditioning and completed by Cooldown.

Warm up session was for 10 minutes with five repetitions for each the following exercises-

- Movement of neck in all directions,
- shoulder rotation,
- elbow flexion- extension,
- wrist rotation,
- lumbar side flexion and rotation,
- hip flexion and abduction,
- knee flexion- extension,
- ankle dorsiflexion- plantar flexion.

The **Mat based Pilates exercise** protocol was for 30 minutes in each session. warm up and cool down movements were performed before and after the exercises.

Neutral Pelvis position was maintained throughout exercise.

1. Hip mobility exercise:

Participants were asked to move single leg outward while inhaling and coming back to neutral position while breathing out. Repeated the same for other limb.

2. Leg floats:

Participants were asked to move hip and knees to 90-90 position while inhaling and return to neutral while exhaling.

3. Chest lift:

Participants were asked to gently roll chest forwards and tuck chin slightly in while breathing in and then roll back to neutral while exhaling.

4. Double Leg Slides:

Participants were asked to slide heels towards the hips while breathing in and return to back while exhaling.

5. Chest Lift :

Participants were asked to place their hands behind head and perform chest lift while breathing in and then roll back to neutral while exhaling.

6. Oblique Lifts:

Participants were asked to place their hands behind head and lift both legs to 90- 90 position. Lift the shoulder towards opposite hip while inhaling , hold for 6 second then roll back to neutral while exhaling.

Cool down was for 5 minutes included the entire warm up exercises performed twice followed by deep breathing exercise for relaxation.

Group B: Subject performed the conventional trunk exercises.

Conventional trunk exercises protocol⁷

- Strengthening Exercises:
- Transverse Abdominus
- Pelvic bridging
- Basic crunches
- VMO Squeeze
- Hip abduction exercise
- Hip extension
- Back extension
- Bicycle in supine
- Superman exercise
- Oblique crunches

Stretching exercises:

Included stretching of quadriceps, ilio-psoas, gluteus major and Quadratus lumborum muscles 10 seconds hold time with 10 repetitions of each exercise were performed. There was a pause of 3 seconds between repetitions and 60-second rest between each exercise.⁵⁰

RESULT

Comparison of Abdominal strength between Group A and B

Unpaired T Test	ABDOMINAL STRENGTH					
	1st day		14th day		28th day	
	Group A	Group B	Group A	Group B	Group A	Group B
Mean	21	18.3	32	25.6	46	35.6
S.D.	7.6	4.8	7.7	5.9	12.3	10.4
Number	15	15	15	15	15	15
Maximum	30	25	45	40	70	60
Minimum	5	10	20	15	25	20

Range	25	15	25	25	45	40
Mean Difference	2.7		6.4		10.4	
T Test	1.143		2.513		2.553	
P value	0.262		0.018		0.016	
Table Value at 0.05	2.05		2.05		2.05	
Result	Not-Significant		Significant		Significant	

Comparison of Lumbopelvic flexibility between Group A and B

Unpaired T Test	Lumbopelvic flexibility					
	1st day		14th day		28th day	
	Group A	Group B	Group A	Group B	Group A	Group B
Mean	9.6	8.3	13.5	11.3	18.8	15.6
S.D.	2.5	3.03	2.4	3.15	2.9	4.04
Number	15	15	15	15	15	15
Maximum	15	13	18	16	25	21
Minimum	5	2	10	5	13	6
Range	10	11	8	11	12	15
Mean Difference	1.3		2.2		3.2	
T Test	1.301		2.125		2.468	
P value	0.203		0.043		0.020	
Table Value at 0.05	2.05		2.05		2.05	
Result	Not-Significant		Significant		Significant	

DISCUSSION

In current study, Significant improvement in abdominal muscle strength & lumbo-pelvic flexibility were noted in both groups. However, significantly improvement is noticed in Pilates group in comparison with the conventional trunk exercise group.

Improvement in abdominal strength:

Conventional trunk exercises used to increase muscular strength causes minimal development of maximal voluntary contraction of the abdominal musculature. This may be appropriate for clinical populations, but does not elicit enough contraction to train the musculature in a healthy population. Therefore, a variety of exercises to promote abdominal musculature strength are needed.

Silva et al found that dynamic Pilates abdominal exercises promotes greater muscle activation of upper and lower transverse abdominis muscle fibres as compared to the conventional trunk exercises.⁸ In Pilates, variety of abdominal exercises are included that challenges the core musculature in a number of ways to achieve the best result in improving both strength and endurance. More challenging body positions are replicated in the series of exercises and muscular actions are well cued throughout the movement series, resulting in more effective utilization of the abdominal muscles.⁹

Porterfield has suggested that proper breathing techniques during exercise also ensure generating sufficient intra-abdominal pressure, to aid in stabilizing the lower back and also reduces the sensation of fatigue and the sensation of effort during exercise.

The result correspond to the study by Sekenidiz et al, who concluded that 5 weeks of one-hourly Pilates training three times weekly is effective in increasing abdominal strength and endurance significantly more than the control group in sedentary women.¹⁰

Improvement in lumbopelvic flexibility:

Pilates has been shown to improve lumbopelvic flexibility more significantly than conventional trunk exercises. The result is well supported by the study of Oliveria et al that also

postulates that Pilates exercises are more effective than static stretching for some body segments. Pilates is a combination of static and dynamic stretching exercises which are safe to provide an increasing flexibility.¹¹ Phrompaet et al also stated when Pilates position is applied, soft stretch to tissues and muscles activates Golgi tendon organ, which results in lengthening of sarcomeres. Repetitive stress increases the plastic deformation of tissues in the elastic range, allowing a gradual rearrangement of the collagen fibres.¹²

CONCLUSION

Study concluded that Mat Based Pilates exercises is more effective than conventional trunk exercises in improving abdominal strength and lumbopelvic flexibility.

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