

Original article:

Effect of Pilates exercise on abdominal strength & endurance, girth & skin fold in young women

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Abstract:

Background: Pilates is an exercise protocol to enhance muscular strength, flexibility, and endurance while it also improved bodily concentration and balance. The abdominal muscles are considered the supporting pillars of vertebral column. There is scarcity of literature on effects of short term Pilates workouts on strength and girth of abdomen in young women.

Aim & Objective: To study the effect of Pilates exercise on abdominal strength, & endurance, girth & skinfold in young women.

Method: The experimental study was conducted on 25 females with BMI between 18.5- 29.9 & age group 18-25 years. Subjects were given Mat Pilates exercise for 5 days per week for 4 weeks. Subjects were assessed for, pre and post program. Measures taken for skin fold measurement were assessed with skinfold caliper, girth by measuring tape, strength & endurance using Brian McKenzie scale.

Results: A significant improvement was seen in strength & endurance, girth, & skin fold measurement.

Conclusion: The study shows that there is significant improvement in strength & endurance, girth, & skinfold measurement after 4 weeks of Pilates exercise program.

Keywords: Pilates, Brian McKenzie scale, strength, skinfold

Introduction

The technological development has led to inactivity becoming the one of the major reason of health problems. Day by day people spend most of their time by sitting. Experts advise and encourage people to engage in daily physical activity to reduce the risk of health problems. There are many types of exercise which helps to improve & maintain physical fitness but people don't prefer to participate on regular basis as most of them include long duration or heavy loading of

muscles.

Researchers also noticed that while regular exercise can improve physical fitness the more intense the exercise the more injury will occur. Especially young girls are more affected in terms of strength and endurance compared with the adults. Enjoyable and proper exercise type needs to be advised to young girls.¹

Abdominal muscles are at the core of our entire body. So, possessing strong abdominal muscles is essential for everyone, irrespective of being an

athletes or not. Strong abdominal muscles are very important for all round fitness, solidity and balance. It also helps to support the back. Having tougher abdominal muscles boosts the physical fitness level which makes carrying out daily activities a lot easier and bolsters your proficiency in sports. Strong abdominal muscles helps to improve endurance during sports and other physical works thus improve the overall fitness of your body. Developing stronger abdominal muscle is very essential for every individual. It not only makes you look attractive, but also improves your overall fitness. Therefore, it is recommended for everyone to start working out for getting stronger abdominal better sooner than later.²

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 exercise modalities which provide a blend of aerobic, strength and to make a physiological difference while providing a mode of exercise that appears easy to perform by the general public. Exercise that combines multiple benefits is especially appealing to time conscious potential exercisers. Pilates has become a world-wide exercise modality which enjoys wide acceptance because of a wide array of ascribed benefits including improved strength, mobility, endurance, flexibility, core stability, proprioception, body control and even a “mind-body” effect in different gravitational planes (Dreas 2002)³.

Pilates is an exercise protocol to enhance muscular strength, flexibility, and endurance while it also improved bodily concentration and balance. Pilates based exercise has been shown to promote changes in habitual posture by enhancing spinal,

scapular and joint flexibility and strengthening shoulder, lower back and abdominal musculature. The exercises can be carried in two different ways namely Pilates mat work and the use of Pilates apparatus. Pilates exercises did positive effects on flexibility, balance, muscular strength and posture reported by researcher. Researchers also advised it to adults because of its benefits¹.

There are many studies that investigated the effects of regular exercises on parameters measuring strength, skin fold & girth but there was scarcity of literature stating the effects of Pilates workouts. Especially effects of short term Pilates workouts on young women needs to be investigation. However, very little research has directly verified the popular claims of abdominal strength, endurance, girth, skin fold and even weight loss.

Aim & Objective

To study the effect of four weeks Pilates exercise on abdominal strength, endurance, girth, & skin fold measurement in young women.

Materials and Method

The experimental study was carried out for the duration of 6 months on 25 females (Age in years: 19.88 ± 2.14 , BMI: 24 ± 2.56) selected with purposive sampling. Inclusion criteria was nulliparous women, female having BMI: 18.5 to 29.9 (normal to overweight) and in the age group of 18 to 25 years. Exclusion criteria was female with any history of major or minor abdominal surgery, present or past history of low back pain and subjects undergoing regular exercises/ yoga/sports. Materials used were measuring tape mounted on wall, skin fold calliper, & mat. Outcome Measures used were Brain McKenzie

scale for core strength and endurance, girth, & skin fold

Procedure

On obtaining ethical clearance from Institute Ethical Committee, subjects were selected according to inclusion criteria mentioned and those who were willing to participate in the program. Detail information about the study was given to the subjects and written consent was taken for those who were willing to participate. Height and weight was taken to calculate BMI. Baseline assessment was done for horizontal skin fold measurement at umbilicus was taken using skin fold caliper. Three measures were taken and then average was calculated. Girth was measured at the level of umbilicus using a measuring tape. Height was assessed using measuring tape mounted on wall. Then assessment of strength and endurance was assessed using McKenzie scale.

All the subjects were then taken for exercise session. The exercise session was given 5 days a week for 4 weeks. There was no dropout.

To start with they were made aware of concept of a neutral pelvis, anterior and posterior tilted pelvis

The Pilates exercise protocol given included:

- Warm up exercise
- Conditioning
- Cool down

Warm up exercise were given for 10 minutes five repetitions for each these include the following exercises- neck movements, shoulder rotation,

elbow flexion- extension, wrist rotation, lumbar side flexion and rotation, hip flexion and abduction, knee flexion- extension, ankle dorsiflexion- plantar flexion.

- All The participants were asked to maintain the pelvis in a neutral position while performing the exercise.
- A demonstration of each exercise was given and a proper sequence of the exercise was taught with appropriate breathing techniques in between this sequence. The pilates conditioning exercise were performed for 30 minutes each session.
- All the exercises were performed in crook lying/ neutral pelvis position.

1. Hip mobility exercise:

Participants were asked to take deep breathe in while moving knee out and breathe out while coming back to back to neutral and repeat the same on the other side with keeping both hips on the floor without arching the back.

2. Leg floats:

Participants were asked to take deep breathe in while moving hip and knees to 90-90 position and breathe out while straightening leg, keeping chest and pelvis parallel to floor , again breathe in getting hip and knee back to 90-90 position. Breathe out and bring the legs back to neutral. Repeat the same on the other side.

3. Chest lift or sit up

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

4. Double Leg Slides

Participants were asked to Place hands on lower abdominals, breathe in and draw the abdominals upwards and inwards. While breathing out, slide both the feet away. Maintaining neutral pelvis position breathe in again and slide heels back as you breathe out.

Now incorporate the chest lift or sit up routine here with hands placed behind head draw the abdominals upwards and inwards as you breathe in and roll forwards as you breathe out, pressing lower chest towards floor. While breathing out slide your heel away from you, maintaining the sit up position. Draw your feet back in as you breathe in Roll back as you exhale.

5. Chest Lift (Sit- up) Holding

Draw abdominals up and in as you breathe in and roll chest forwards as you breathe out. Hold this position for 6 breaths. Emphasize TA with each breathe. Exhale and roll back to neutral.

6. Oblique Lifts

Place hands behind head and lift both legs to 90-90 position, shoulder and pelvic girdle should be anchored to the floor. As you breathe out, do a gentle nod and a try to take your shoulder towards opposite hip, ensuring the hips are still

on ground. Roll back as you breathe in. Breathe out as you roll back to opposite side. Breathe in as you roll back to neutral. Do not over rotate your body i.e. hips should not roll off the floor.

After every exercise supine lying with crook lying position was attained to proceed for next exercise. To begin with every exercise, the neutral pelvis was identified and maintained.

Cool down:

Performed for 5 minutes.

- All warm up exercise done twice
- Relaxation with deep breathing exercise

After the first session of exercise, 5 subjects suffered cramp like pain. The participants continued all the exercise even during their menstruating days. At the end of 4 weeks, subjects were assessed for weight, girth, strength and endurance.

Data was analyzed using paired and unpaired t-test on SPSS version 16.

Observation and analysis:

	Pre (Mean+ SD) —	Post (Mean+ SD) —	T value	P value
Strength and endurance	0.28+0.54 —	1.08+0.86 —	-8.00	<0.05
Girth	31.58+2.34 —	30.8+2.61 —	4.207	0.0003
Skin fold	29.22+4.88 —	28.0+4.81 —	9.082	<0.05

Discussion

The Pilates method has a main objective to strengthen the abdominal and pelvic muscles. These muscles, including the iliopsoas, lumbosacral region, pelvic floor and quadriceps, are widely used to stabilize the torso, providing thereby improvement in the pain condition, spinal stabilization, and posture maintenance also preventing damage.

The Mat Pilates are the exercises performed on the floor wherein our own body weight and gravity is used as resistance.¹⁰

One of the key Pilates techniques to align, lengthen, and protect the spine is to draw the navel to the spine. Abdominal hollowing, or the abdominal drawing-in maneuver, preferentially recruits TrA, internal obliques, and multifidi. One of the proposed benefits of hollowing is to decrease the laxity of the sacroiliac joint more than abdominal bracing. Pilates emphasized posture as an integrated whole-body activity. Muscles not

primary to the movement pattern remain actively engaged and in alignment with each exercise. This concept exemplifies muscle integration in lieu of isolation and illustrates an application of the regional interdependency approach. Total leg strengthening, total arm strengthening, and total core strengthening capitalize on the radiation concept, whereby weaker muscles are facilitated by the stronger ones in the movement pattern. In the Pilates stance, body weight is maintained slightly forward on the balls of the feet. With the core already engaged and with alignment optimal, the spine is prepared and protected for performing more skilled tasks. To stabilize the spine for a movement pattern, the TrA and multifidi activate up to 100 milliseconds prior to limb movement, regardless of limb direction. Increased core muscle activity is needed on unstable surfaces or with a single-limb stance¹³.

The present study was conducted to study effect of Pilates program on abdominal strength, endurance,

girth, skin fold measurement, & weight in young women. With regard to the results of this study, Pilates exercises as found to be an efficient training method with significant changes in abdominal strength, and endurance in sedentary adult females. There is improvement of strength which occurs due to deep inhalation, the diaphragm drops allowing more air to the lungs, this volume of air of lungs increases the pneumatic pressure within the abdominal cavity due to drooping of diaphragm resulting in increase in the pressure of the entire trunk providing greater strength stabilization and will increase the core stability of the trunk. (Chaitow and Delany 2002). In the present study the subjects showed significant reduction in girth and skin fold measurement. This could be because strengthened abdominal muscle would have firmed the waist line, improved posture and resulted in trimmer appearance. Due to gravity there is anterior pelvic tilt, so to maintain the spine neutral, it is required to strengthen the abdominal and toning of the abdominal muscles. So after toning of the abdominal muscles, the pelvic position is corrected thereby decreasing abdominal belly in size. Thus reduction in the girth is seen.

Current research has demonstrated that regular participation in a physical exercise program is likely to induce positive changes in the Body Composition profile (e.g., reduced percentage body fat, increased lean body mass). The magnitude of these changes is mediated, among others, by the exercise volume performed (i.e., frequency, intensity, duration) (Jakicic et al., 2001). According to Olson et al. (2004), completion of 30

to 45 min Pilates mat exercise program elicited sufficient stimuli to induce positive changes in energy expenditure (EE) in kilojoules per minute (kJ/min) to reduce body composition. Segal et al., 2004 concluded that Pilates studies where body composition did not change might have not provided sufficient training stimuli. Perhaps in some of the studies reviewed (Jago et al., 2006; Segal et al., 2004), the optimal exercise intensity was not reached. Olson et al. (2004), reported that an 'advanced work' level in Pilates mat produced an Energy Expenditure = 33.49 kJ/min, whereas 'basic work' elicited an Energy Expenditure = 19.26 kJ/min⁸.

Sekendiz et al. (2007) examined the effects of Pilates exercise on abdominal and lower back strength, abdominal muscular endurance and posterior trunk flexibility of sedentary adult females in the age

26-47. They concluded that there was a positive effect of Modern Pilates mat exercises on abdominal and lower back muscular strength, abdominal muscular endurance and posterior trunk flexibility in sedentary adult females regardless of the fact that the body weight and fat percentages did not differ significantly. These results are similar to the results of our trial.

Conclusion

The study shows that there is significant improvement in strength, endurance girth, & skin fold measurement in young women after 4 weeks of Pilates program.

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