

ORIGINAL ARTICLE

# The Impact of Selected Pilates Exercises on Dynamic Balance of Non-Athletics Women Over 50 Years

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**Abstract:** Today, the life style has moved towards immobility and inactivity due to expansion of machine life. On the one hand, most of our routine and daily activities occur in a dynamic and semi-dynamic environment that requires a good balance. This factor undermines in the aged people for some reasons such as Atrophy; Cultural-Social factors and etc. this research aiming at evaluation of effects of selected Pilates exercises on balance of non-athletics women over 50 years. Pilates exercises are a chain of special trainings for stretch and increase of body equilibrium. This training method suggests a complete technique for improving body's vertical position, awareness and promotion of body posture enabling trainers to stretch in many directions and positions. This research examined 24 symptomatic women aged 63-67 whose participation were voluntarily and through a general health questionnaire. They lived in Kahrizak charity center in Karaj who included %22/08 of center population. They randomly divided into control and examine groups. According to exercise protocol, they were trained three times a week (half an hour sessions). Pre-test and post- test were taken from subjects based on SEBT method. Said method enables us to measure body dynamic balance in eight anatomic directions. Improving body dynamic balance in six directions: Anterior; Posterior; Lateral; Antero-Medial and Postero-Medial. No improvement seen in two directions: Anterolateral and Posterolateral.

**Keywords:** Pilates Exercises, Dynamic Balance, SEBT Test, Core Body.

## Introduction

Pilates exercises can effect body balance by strengthening central muscle and influencing deep and central muscles. Also Pilate's exercises can increase body balance by strengthening body's central muscles as a result of enhancing body's central strength and force as well as impacting movement performance and patterns. Possibility of falling down reduced in old people due to change and improvement in movement patterns (Kaikkonen, 1994). Eight principle Pilates

are: 1. Breathing, 2. Center, 3, Coordination, 4. Concentration, 5. The Executive Power, 6. Neutralizing, 7. Keep right the body, 8. The flowing movement (King, 2005).

Core of body can be defined as series of lumbar, pelvic, femur muscles. Core of body actually locates at body's center of gravity from where creates body movements (Kaikkonen, 1994). One of the functions related to core of body is maintenance of vertical posture (alignment). This means that body position associated with body mechanics. Another function of body core is maintenance

of body's dynamic balance during functional activities resulted in prevention of dissimilar patterns in movement chain. On the other hand, body balance considered as one of the main parts in routine and daily activities as well as moving duties (Richardson, 1999).

Balance is a complex movement skill that describes the dynamic of body position for preventing falling (Punakallio, 2005). The balance is needed for routine and daily activities because walking is an activity done due to balance maintenance and imbalance. Increase in age causes muscular diminution and exhaustion resulted in decrease in movement and physical readiness factors especially in aged people experiencing falling phenomenon, one of the major elements of death in this group. Pilates has many benefits, some of them are mentioned below: 1. Improving the balance. 2. Improve blood coordination and circulation. 3. Improving Performance in Sports. 4. Increase the capacity of the lungs (inhalation). 5. Improve strength and flexibility. 6. Improving Stature. 7. Increase core strength / stability and peripheral mobility. 8. Increase Bone Density. 9. Joint health and positive body awareness. 10. Improvement of physical problems

This research intended to assess the impact of a period of Pilates exercises on women above 50. Pilates exercises are a chain of special trainings for stretch and increase of body equilibrium. This training method suggests a complete technique for improving body's vertical position, awareness and promotion of body posture enabling trainers to stretch in many directions and positions.

## Materials and Methods

This research is a semi-experimental. Participants were selected randomly. The research is classified among cause and effect researches. The effect of independent variable on dependent variable was examined by means of tentative scheme of pre-test/ post-test with a control group. This research examined 24 non athletic women aged 55-80 randomly selected from Kahrizak charity center in Karaj and

subject anthropometric characteristics are: Average height: 151.20 cm; Weight: 68.08 kgs; Age: 62-67; BMI: 30.28 KG/cm; Leg length: 81.79cm. Subjects possessed one of the bellow features were identified and excluded by means of a questionnaire completed by them: A) History of multilateral sprain and ankle surgery. B) History of multilateral injury and surgery in knee. C) History of multilateral injury and surgery in hip. D) Anesthesia Record. E) Neurological deficiency or CNS. F) History of neurological disease or taking medicines affecting nervous system (Richardson, 1999; Robinson, 1992; Woollacott & Tang, 1997)

SEBT pre-test was taken from participants for assessing body's dynamic balance. After that experimental group was trained by a kind of exercises named Joseph Pilates three times a week each session lasted half an hour for eight weeks. They performed nine types of exercises in each session. At the end of eight weeks, a SEBT post-test was taken from two groups. At the beginning of the test, the actual length of the leg i.e. Superior-Anterior alliums pine to inner ankle were measured for normalizing data and comparing participants without any concern about sex and personal differences, since such differences could be ignored with division the distance between leg length.

## Results

Normalization of data was measured by use of conversion indices. The results of indices showed that the data with close distribution to curve are normal and gained values are near to average. In pre-test had no meaningful differences in both experimental and control groups that imply at the beginning of the research all participants had almost an identical balance.

Also the comparison of distances in control group's pre-test and post-test resulted no meaningful differences while there were meaningful differences at several aspects in experimental group's pre-test and post-test. The results of comparison between independent groups' pre-test and post-test are shown in table 1.

**Table 1.** The results of t test in independent groups.

Direction	Experimental group	Control group
Anterior	0.005	0.910
Posterior	0.024	0.819
Lateral	0.004	0.300
Medial	0.015	0.338
Anteromedial	0.001	0.384
Anterolateral	0.072	0.266
Posteromedial	0.021	0.151
Posterolateral	0.162	0.995

Moreover; there were a meaningful differences in the results of comparison between experimental and control groups' pre-test and post-test. The results of comparison between dependent groups' pre-test and post-test are shown in table 2.

The results indicated some improvements at most aspects including Anatomic direction Anterior; Posterior; Lateral; Medial; Anteromedial; Posteromedial has changed. No improvement has seen in Antero-Lateral and

Postero-Lateral parts. According to statistical results, participants' balance improved at most aspects of SEBT test.

The control and stabilization of reliance foot required that the changes of acceleration; adjustment of paired forces; co-contraction of muscles as well as trunk and lower members to be controlled. For example co-contraction of hamstring and quadriceps muscles co-occurred with SEBT action in all directions.

**Table 2.** The results of t test in dependent groups.

Direction	Experimental group	Control group
Anterior	0.004	0.989
Posterior	0.025	0.959
Lateral	0.013	0.893
Medial	0.023	0.895
AnteroMedial	0.001	0.732
Anterolateral	0.068	0.862
PosteroMedial	0.018	0.814
Posterolateral	0.158	0.999

### Discussion and Conclusion

The center of body includes Lumber; Pelvic and Femoral muscles as a whole controls muscular structure that causing force production and force reduction as well as dynamic stability during movement chain by co-operation at the same space (Mc Gill, 2001). The quality of this action during functional activity requires efficiency and optimal neuromuscular control (Kaikkonen, 1994).

On the other hand, SEBT neuromuscular control necessitates suitable condition around hip joint as well as muscular area during the test (Mc Gill, 1998). In their study, Olmsted and his colleagues found that reliance foot required dorsi flexion, ankle flexion, knee flexion and hip flexion during the test. Therefore; lower members need suitable

movement range, power, and activity of deep receivers and the neuromuscular control (Mc Gill, 2001).

Aral and Hurtle (2001) proved that SEBT directly dependent on the activity of lower member except twine muscles. In this way, the control of body center and dynamic balance are related together when they are analyzed by SEBT (Mc Gill, 1998). According to Bist, the stability of trunk and pelvic is essential for the movement of all members. The change in pelvic position can effect on biomechanics of pelvic-hip through muscular rigidity. But hip strategy is one the three main strategies for controlling body balance occurring when major disorders affecting balance and preventing imbalance (Akuthota & Nadler, 2004; Beckman & Buchanan, 1995). The optimal control of this joint and its stability after pilates exercises can

be considered as one the reasons for effects of these exercises on balance because the maintenance of balance needs the control of acceleration changes and the balance in twin forces for stability of reliance foot. Knee joint places after hip joint in movement chain referred to as the victim of instability in body center, as the hip muscles play an important role during sport exercises. Therefore; the existence of stability in lower member proximal is essential for stability and position of lower members for preventing injury (Andersson et al., 1996). The control and improvement in function of muscles and controlling nerves is another reason for effects of such exercises on extent of distance (King, 2005).

Richardson suggested that correct co-contraction in transverse abdominal muscles and quadriceps muscles occur independent from large muscles, neutral position of spines and low levels of sustained tonic contractions. This activating causes muscular tightness and sustainability in separate parts resulting optimal

## References

- Andersson EA, Oddsson L, Grundström H, Nilsson J, Thorstensson A, 1996. EMG activities of the quadratus lumborum and erector spinae muscles during flexion-relaxation and other motor tasks. *Clin Biomech.* 7: 392-400.
- Akuthota V, Nadler SF, 2004. Core strengthening. *Archives of Physical Medicine and Rehabilitation.* 85: 86-92.
- Beckman SM, Buchanan TS, 1995. Ankle inversion injury and hypermobility: effect on hip and ankle muscle electromyography onset latency. *Arch phys Med Rehabil.* 76: 1138-1143.
- Kaikkonen A, 1994. A performance test protocol and coring scale for the evaluation of ankle injuries. *AMJ sports Med.* 22, 462-69.
- King MA, 2000. Core stability creating a foundation for functional rehabilitation. *Athl Ther Today.* 5: 6-13.
- King MA, 2005. An overview of motor learning in rehabilitation. *Athl Ther Today.* 8: 6-13.

functioning in use of main motor muscles (King, 2000). As a result delay in starting the activity of transverse abdominal muscles causes inefficiency in the stability of spine cords. Therefore; strengthening some muscles such as transverse abdominal muscles create reliance for main motor muscles of trunk and lower members resulted in their optimal performance. Some muscles like hamstring and quadriceps muscles that are the main muscles in control and stability of reliance foot resulted in strengthening of muscles as well as improvement in balance.

In conclusion, the results of this study indicate that the selected Pilates exercises will improve body balance. Based on the exercise protocol used in this study, it can be assumed that these exercises can be used in cases required improvement in muscular-neural control, increase in strength and flexibility and decrease in extent of injury without any need to muscular hypertrophy.

- Mc Gill, SM. 1998. Low back exercises: evidence for improving exercise regimens. *Phye Ther.* 78: 754 -65.
- Mc Gill SM, 2001. Loe back stability: from formal description to issues for performance and rehabilitation. *Exerc Sport Sci Rev.* 29: 26-31.
- Punakallio A, 2005. Balance abilities of workers in physically demanding jobs: with special reference to fire fighters of different ages. *J sports Sci & Med.* 4: 7-14.
- Richardson C, 1999. Therapeutic exercise for spinal segmental stabilization in low back pain: scientific basis and clinical approach. Edinburgh, NY: Churchill living stone.
- Robinson R, 1992. The new back school prescription: stabilization training part I. *Occup Med.* 8: 304-321.
- Woollacott MH, Tang PF, 1997. Balance control during walking in the order adult: research and its implications. *Phys Ther.* 77: 646-660.