



Effects of Task Specific Exercise Program Versus Pilates to Improve Balance in Elderly Population

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Abstract

Introduction: The term “aging” refers to the biological process of growing older in a deleterious sense. Aging will result in certain changes within the elderly persons gait pattern which includes decrease of gait velocity, step length & a wider base. Poor balance and inability to control the position of the body, is a significant contributor for falls in older people. **Aim:** This study aims to determine the effectiveness of Pilates and task specific training to improve the balance in the elderly population. **Methods And Materials:** The subjects with age 60 to 65 years old, both male and females with good visual and auditory function were included in the study and use of any assistive devices (like cane, walking stick), Obese subjects, amputees, history of any surgery (like -hysterectomy, TKR) and recent fracture or any injury were excluded from this study. The subjects were divided into Group A and Group B. Group A underwent Task-Specific Training and Group B – Pilates training for 6 weeks for 3 days per week. POMA-T (Tinetti-performance oriented mobility assessment) was used as outcome measure to evaluate the balance before and after intervention. **Result:** According to the numerical data obtained from the statistical analysis the significant improvement was noticed with the pre and post -test values of both the groups, balance increased from (17.33 TO 22.4) with p-value <0.0001 in GROUP-A and GROUP-B from (18.07 TO 24.3) with p-value <0.0001. **Conclusion:** Balance can be improved in elderly population by using this exercise protocol.

Keywords

Elderly, Fall, Pilates, Task specific exercise

INTRODUCTION:

The term “aging” refers to the biological process of growing older in a deleterious sense. Changes that occur during aging are partly the result of gradual decline of function of different body systems which leads to loss of physical, mental and social well-being.

Aging will result in certain changes within the elderly persons gait pattern which includes decrease of gait velocity, step length and a wider base. These changes are most pronounced when older people walk on irregular surfaces.

Static balance refers to the ability to maintain balance during postural maintenance by keeping the

center of gravity within the base of support. Dynamic balance is the ability to maintain balance when the body moves and to maintain a desired posture by keeping the center of gravity within the base of support during body movement. Trunk stabilization exercises are helpful in enhancing balance ability and physical stability. Activity of the trunk muscles maintains balance against gravity, adjusts posture, and prepares for the movement of the extremities in activities of daily living.

Poor balance and inability to control the position of the body, is a significant contributor for falls in older people. Balance requires the complex integration of sensory information regarding the position of the body in relation to the surroundings, and the ability to generate appropriate motor responses to control body movement.

Falls can be markers of poor health and declining function and are often associated with significant morbidity. Risk factors for falls in the elderly include increasing in age, use of medication, cognitive impairment and sensory deficits. Most injurious falls occur during the performance of daily activities such as walking, transferring, bending or reaching. Fear of falling has been found to increase with age and following a history of falls among the elderly. Fear of falling may lead to inactivity and avoidance of regular daily activities, thus result with decreased quality of life.

Balance is required for maintaining a position, remaining stable while moving from one position to another, performing activities of daily living, and moving freely. However, a decline in balance ability has been shown to occur with increasing age. postural disturbances frequently result in falls and may consequently lead to negative consequences, such as injuries in the elderly population. Previous studies have proved that participating in any kind of physical activity has positive effects in improving balance in elderly people.

The most effective strategy for falls prevention involves a multifactorial evaluation followed by targeted interventions for identified contributing factors. Evidence on the effectiveness of interventions for gait and balance disorders is limited because of the lack of standardized outcome measures determining gait and balance abilities. However, effective options for patients with gait and balance disorders include exercise and physical therapy. Most exercises for the improvement of balance ability aim to stabilize the trunk. Pilates exercises also stresses strengthening of the muscles to stabilize the trunk can be done through core strengthening exercises. Balance exercise on an

unstable base of support is also used clinically to stabilize the trunk. contributors to consequences of the age-related walking problems seen in aged people are walking is slow, less stable, inefficient, and the timing and coordination of stepping with postures and phases of gait is poor. It has been argued that timing and coordination problems are evidence of the loss of motor skill in walking, also decrease in physiological reserve capacities [muscle strength, motion, and endurance. The loss of motor skill related, high energy cost of walking (e.g. inefficient) is a major factor in the age-related decline in physical function and activity for older adults.

AIM OF THE STUDY:

This study aims to determine the effectiveness of Pilates and task specific training to improve the balance in the elderly population

MATERIALS AND METHODS:

Study Design - Experimental study
Study Type - Comparative study
Study Method - Convenient sampling
Sample Size - 60 subjects
Duration - 3 days per week, 6 weeks
Inclusion Criteria -

- The subjects with age 60 to 65 years old.
- Both male and female subjects were included.
- Subjects with good visual and auditory function.

Exclusion Criteria –

- Use of any assistive devices. (cane, walking stick)
- Obese subjects.
- The experiment excluded amputees.
- Subjects with history of any surgery. (hysterectomy, TKR)
- Recent fracture or any injury. (RTA)

Outcome Measures –

POMA-T (Tinetti-performance oriented mobility assessment)

PROCEDURE:

The 60 elderly people who were selected according to the inclusion and the exclusion criteria actively participated in the exercise program. The study was conducted for 6 weeks. The duration of exercise program was about one hour per day and was done for 3 times per week (alternate days). The subjects were equally divided into two groups [GROUP A] and [GROUP B] where GROUP A performed task specific exercise program and GROUP B did Pilates exercise. Before starting with the exercise program, both groups performed certain warm up exercises which

includes trunk flexion, trunk rotation, knee flexion and extension while standing and sitting, neck (flexion, extension, lateral rotation), neck lateral flexion and shoulder rotation, Finally the subjects completed the exercise program with self-stretching exercises for cool down.

The task-specific exercise program compiled with 3 stages. [GROUP A]

Stage 1: [1 & 2 wee]

sit to stand -30 reps (2 sets)

10 meter of walking - 5 rounds

Stage: [3 & 4 week]

sit to stand - 30 reps (2 sets)

10 meter of walking - 5 rounds

Tandem stance – 30 seconds (5 sets)

Up on toes - 30 seconds (5 sets)

one foot up - 30 seconds (5 sets)

Stage 3: [5 & 6 week]

sit to stand - 30 reps (2 sets)

10 meter of walking - 5 rounds

Tandem stance - 30 seconds (5 sets)

Up on toe - 30 seconds (5 sets)

one foot up - 30 seconds (5 sets)

Tandem walking - 10 meters (2 rounds)

Kicking and retrieving a ball - 5 minutes

Pilates exercise [GROUP B] 30 secs rest time

SL NO	EXERCISE	REPETITION	SETS
1	Single leg stretches	10	5
2	Spine stretch	10	5
3	Swan exercise	10	5
4	Single leg kick	10	5
5	Half squats	10	5
6	Back lift	10	5
7	Knee twist	10	5
8	Hundred	10	5
9	Marching	10	5

RESULT:

60 elderly subjects aged (60 -65 yrs.) participated in the study, the balance measurement was done by Tinetti-performance oriented mobility assessment, the measurements were done before starting with the exercise training and after the completion of 6 weeks of exercise program. According to the numerical data obtained from the statistical analysis the significant improvement was noticed with the pre and post -test values of both the groups. based on the obtained data balance increased from (17.33 TO 22.4) with p-value <0.0001 in GROUP-A and GROUP-B from (18.07 TO 24.3) with p-value <0.0001 (Table 3 and Figure 3).

DISCUSSION:

Age and lack of physical activity both are responsible for poor balance in elderly people, poor balance has repeatedly been shown to be a risk factor for falls in community dwelling older adults. Balance has three basic dimensions (maintenance of a position, stabilisation for voluntary movements and reaction to external disturbances). physical activity and exercise are one of the most important strategies for maintaining health and reducing the risk of physical and mental conditions during old ages

Determining that a gait is abnormal can be challenging, because there are no clearly accepted standards to define a normal gait in an older adult. Other characteristics of gait that commonly change with aging include an increased stance width, increased time spent in the double support phase (i.e., with both feet on the ground), bent posture, and less vigorous force development now of push off. These changes may represent adaptations to alterations in sensory or motor systems to produce a safer and more stable gait pattern

The present research aimed to study the effect of 6 weeks of Pilates exercise and task-specific exercise program to improve balance in elderly people aged over 60 -65 yrs. and resulted with increase of balance and reduced risk of fall. Both exercise intervention had significant improvement in balance among the elderly population. But the Pilates exercise seem to be more effective when compared with task-specific exercise program. Previous study state that Pilates exercise is an effective exercise for postural symmetry, respiration control, abdominal muscle strength, spinal, pelvic, and trunk stability, muscle flexibility, joint mobility, and muscle strength improvement, positively influencing enhancement in balance.

According to Physical Activity and Health: A Report of the Surgeon General (1996), "Given the numerous health benefits of physical activity and the hazards of being inactive are clear. Creating exercise-training programs that address the specific concerns of physical inactivity, that are accessible and enjoyable, and that have been shown to provide health benefits for participants. Pilates has been promoted as an exercise that would meet these criteria. Even though Pilates has over an 80-year history, few empirical research studies have been conducted on its efficiency to improve basic physiological variables it touts improving such as muscular strength, muscular endurance, balance, flexibility, and so on. Robert concluded that "age related decreases in vestibula, visual, auditory and somato-sensation in normal older people were only weakly correlated with changes in gait and balance - this shows that elderly with normal vision and auditory function are also subjected for imbalance

In addition, Siqueira Rodrigues et al (2010) investigated the effect of Pilates exercise program on 52 elderly women. The experimental group participated in Pilates exercises for two sessions per week for 8 weeks. Results showed a significant improvement in personal independence, static equilibrium and quality of life of elderly people. This study has proven that the balance exercise in the form of Pilates or task specific exercise will improve the balance in the elderly people.

CONCLUSION:

Both task specific exercise program and Pilates exercise had significant increase in balance among elderly subjects. according to the statistical analysis (group B) had better improvement when compared with (group A) in improvement of balance. Physical activity is very essential in case of elderly population in order to maintain social and physical well-being

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APPENDIX 1: TINETTI-PERFORMANCE ORIENTED MOBILITY ASSESSMENT

BALANCE SECTION

Patient is seated in hard, armless chair;

		Date		
Sitting Balance	Leans or slides in chair	= 0		
	Steady, safe	= 1		
Rises from chair	Unable to without help	= 0		
	Able, uses arms to help	= 1		
	Able without use of arms	= 2		
Attempts to rise	Unable to without help	= 0		
	Able, requires > 1 attempt	= 1		
	Able to rise, 1 attempt	= 2		
Immediate standing Balance (first 5 seconds)	Unsteady (stagger, moves feet, trunk sway)	= 0		
	Steady but uses walker or other support	= 1		
	Steady without walker or other support	= 2		
Standing balance	Unsteady	= 0		
	Steady but wide stance and uses support	= 1		
	Narrow stance without support	= 2		
Nudged	Begins to fall	= 0		
	Stagger, grabs, catches self	= 1		
	Steady	= 2		
Eyes closed	Unsteady	= 0		
	Steady	= 1		
Turning 360 degrees	Discontinuous steps	= 0		
	Continuous	= 1		
	Unsteady (grabs, staggers)	= 0		
	Steady	= 1		
Sitting down	Unsafe (misjudged distance, falls into chair)	= 0		
	Uses arms or not a smooth motion	= 1		
	Safe, smooth motion	= 2		
	Balance score		/16	/16

GAIT SECTION

Patient stands with therapist, walks across room (+/- aids), first at usual pace, then at rapid pace.

		Date		
Indication of gait (Immediately after told to 'go')	Any hesitancy or multiple attempts	= 0		
	No hesitancy	= 1		
Step length and height	Step to	= 0		
	Step through R	= 1		
	Step through L	= 1		
Foot clearance	Foot drop	= 0		
	L foot clears floor	= 1		
	R foot clears floor	= 1		
Step symmetry	Right and left step length not equal	= 0		
	Right and left step length appear equal	= 1		
Step continuity	Stopping or discontinuity between steps	= 0		
	Steps appear continuous	= 1		
Path	Marked deviation	= 0		
	Mild/moderate deviation or uses w. aid	= 1		
	Straight without w. aid	= 2		
Trunk	Marked sway or uses w. aid	= 0		
	No sway but flex. knees or back or uses arms for stability	= 1		
	No sway, flex., use of arms or w. aid	= 2		
Walking time	Heels apart	= 0		
	Heels almost touching while walking	= 1		
	Gait score		/12	/12
	Balance score carried forward		/16	/16
	Total Score = Balance + Gait score		/28	/28