



Research Article

A STUDY ON EFFECT OF PILATES ON DYNAMIC BALANCE, PROPRIOCEPTION AND FEAR OF FALLING IN ELDERLY INDIVIDUAL

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ABSTRACT

Background: Fear of falling in elderly is a major cause of loss of independence, which has an effect on the physical function in elderly individuals. Loss of balance is another important public health problem for older adults, because old age life might have devastating consequences, such as an increase in mortality. Fear of fall, dynamic balance and proprioception of older adults has become an important issue, because of demographic changes resulting from the ageing of the population.

Objective-To compare the effects of conventional therapy and Pilates with conventional therapy on dynamic balance, proprioception and fear of falling in elderly individual.

Methods: The sample consisted of 62 elderly people of age between 65 years to 75 years. The group A subjects were asked to perform OTAGO exercise programme as a conventional training and group B performed Pilates exercises along with the OTAGO exercise programme. Dynamic balance and proprioception was assessed using the sensamove balance board, fear of falling was measured using falls efficacy scale (FES).

Results: The data was analysed by SPSS VERSION 16. Pre and post intervention within group was done using paired t test which shows highly significant difference in both groups in all the outcome scores. Comparison between groups was done using independent t test which showed significant differences in both groups for all variables.

Conclusions: The results of this study shows that both Pilates as well as Conventional training program leads to significant improvement in fear of fall, dynamic balance and proprioception in elderly individuals. However Pilates intervention was found to have greater benefits compared to the conventional balance intervention for all variables.

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INTRODUCTION

The loss of balance and falling, is the sixth leading cause of death in the elderly population¹. Factors underlying for the falling of elderly include, lower limb muscle weakness, balance and an abnormal gait, decreased muscle strength^{2,3}. Reduction in skills of balance and impairment in proprioception are key factors of falling and other motor problems of the elderly⁴. So, there is a correlation between loss of balance and falling in the elderly⁵.

Therefore, exercises that aim to improve balance are a key component of fall prevention programs in both clinical practice and the research⁶. With age due to strength loss of the lower limb muscles and decreased joint position sense, balance and proprioception is impaired^{6,7}.

Conventional balance exercise have been proven effective in improving functional ability in addition to reducing risk of falls in elderly individuals^{8,9}. Pilates is an exercise system by the late Joseph Pilates in the 1920s as method of rehabilitation¹⁰. He designed an exercise program with the objective of increasing muscle strength, endurance, and flexibility while maintaining spine stabilization^{10,11}. Pilates Exercises or movements were done on a mat and on an exercise ball or in standing position while emphasizing on spinal and pelvic alignment, maintaining core contraction and the rhythm of respiration¹¹⁻¹³.

Aims and Objectives

To compare the effects of conventional therapy and Pilates with conventional therapy on dynamic balance, proprioception and fear of falling in elderly individual.

Several studies have been conducted showing beneficial effects of Pilates intervention in improving balance and postural stability in elderly population. However, till date less prospective studies are found making the comparison between the effectiveness of Pilates and Conventional Balance Training

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program in improving functional balance and Proprioception in the elderly population.

Null hypothesis H0 states that, there is no difference on dynamic balance, proprioception and fear of fall between two groups. Alternative hypothesis H1 states that, there is difference on dynamic balance, proprioception and fear of fall between two groups.

METHODOLOGY

The Study design was experimental study. Population included elderly individual of 65 to 75 years of age, participating in free camp organized by senior citizen organization committee, Surat. Sampling technique was Purposive sampling. Study duration was 12 months. Sample size was 62. Study Setting was in Senior citizen organization committee, Surat.

Inclusion criteria: Volunteers were considered for inclusion in the study if they met the following criteria: 65 -75 years of age. Willingness to do physical exercise with regular attendance. Able to do daily activities by themselves. Able to walk at least 30 feet with or without an assistive device. Fear of fall scoring >20 in 16 item FES international scale.

Exclusion criteria included Any somatosensory disorder that affects balance, recent fracture within 6 months, low back pain, abdominal surgery within 6 months, Any known cardiovascular and psychosomatic disorder which limits physical daily activities.

Materials and tools used for the study included Pilates Mat, Exercise ball, Marker to mark floor, Sensamove balance board, Chair for support, Clipboard with FES sheet, Sphygmomanometer, Stethoscope.

Outcome measures: Dynamic balance and proprioception was measured using sensamove balance board.¹⁶ Fall Efficacy Score by FES international scale.³

Procedure: Ethical clearance was taken from institutional ethical committee. The confidentiality of the patients were maintained. Subjects were preliminary screened based on the inclusion and exclusion criteria. They were allocated into two groups using Quasi randomization. GROUP A received Conventional therapy and GROUP B received Pilates training. On the first day of first week, pre test measurements of Dynamic Balance and Proprioception were taken on the sensamove balance board. Record was saved in computer.

After each subject performance, calibration of machine was checked. FES International Scale was used to measure the fear of falling in daily activities.

Group A: Conventional therapy. In this group all subjects underwent Otago Exercise Programme. It includes: Flexibility exercises, Leg strengthening exercises and Balance retraining exercises. All exercises of each component were done for 10 minutes with a rest period of 5 minutes before commencing the other component exercises, and lasted for about 40 minutes. All subjects underwent this treatment session for 3 days per week.

Group B: Pilates Training, in this group all subjects underwent pilates exercise training plus conventional therapy by certified pilates trainer. Exercises included Hundred (with head down) Shoulder bridge, Single leg circles, Alternate toe tap, Standing side splits, Ball wall squat, Tandem walking, Ball leg lift.

All subjects underwent the pilates treatment session, for 3 days per week. Exercises were held in small groups of two or three subjects only ensuring correct execution. All exercises were done for 10 repetitions with a rest period of 5 minutes before commencing the conventional exercise, and lasted for about 45 minutes.

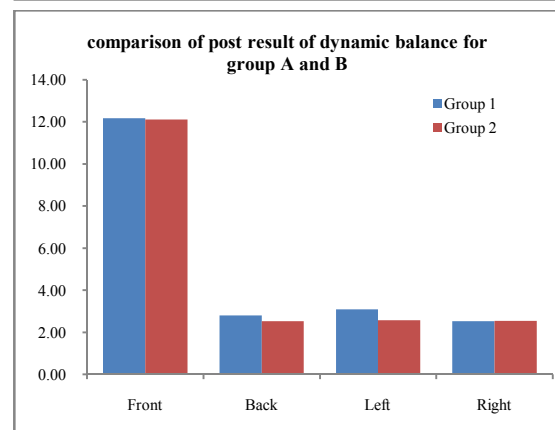
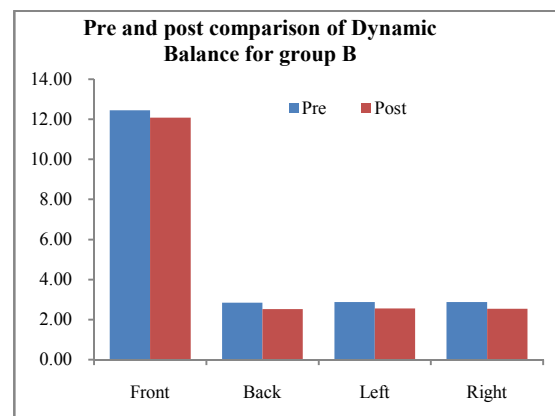
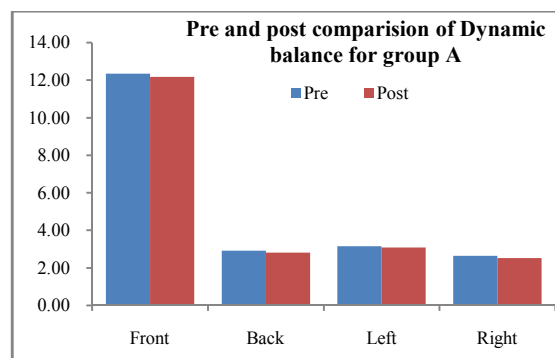
The procedure was continued for 8 weeks for both groups. Data of all subjects was taken on 1st and 56th day. Data was evaluated on sensamove balance board which gave result of balance and proprioception. Scoring of fear of fall was done on FES International Scale.

Statistical Analysis

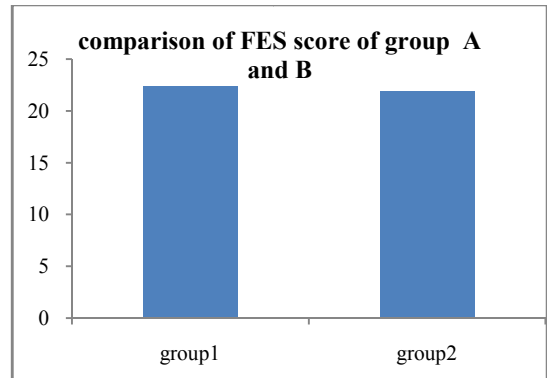
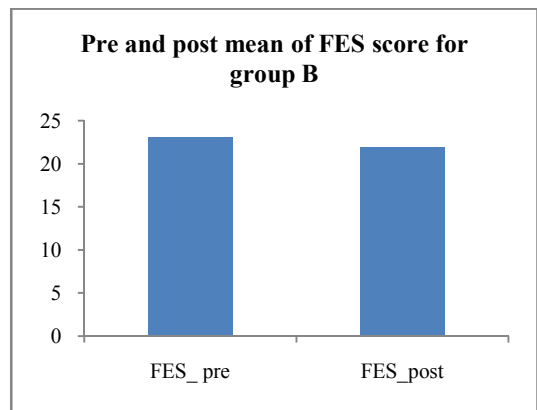
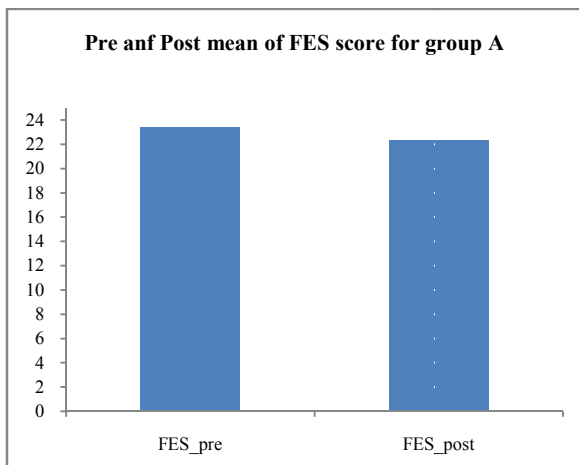
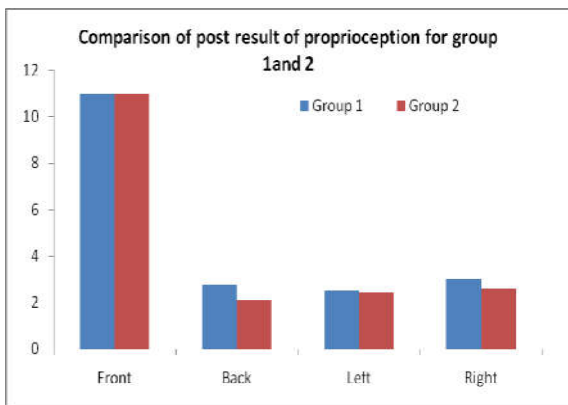
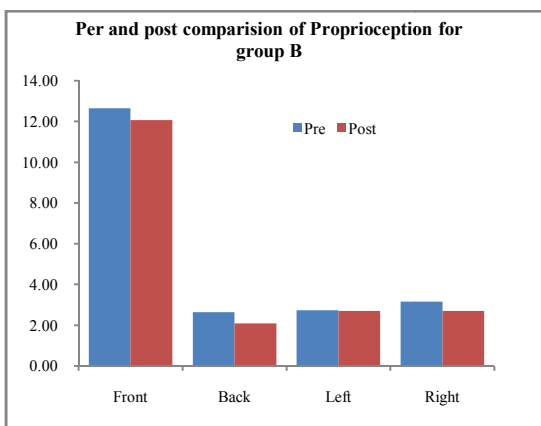
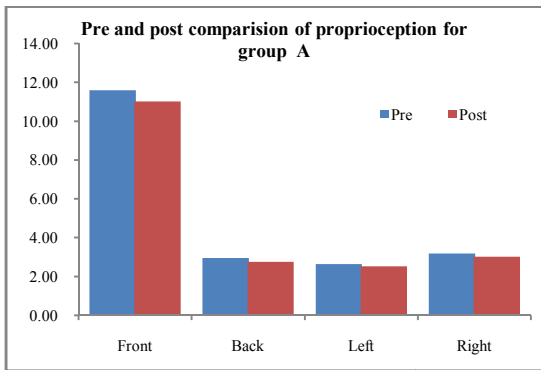
Was done using SPSS-16. Paired t test was used to measure the score of pre and post readings of all three different variables in each group. Independent t test was used to determine intervention effect between the groups for all the three variables. The level of significance was set at 95%.

RESULTS

The groups were homogenous at baseline in their demographic details and outcome scores with p-value >0.05.



Pre and post intervention within group was done using paired t test which shows highly significant difference in both groups in all the outcome scores. Comparison between groups was done using independent t test which shows significant differences in both groups for all variables.



DISCUSSION

This study showed that Pilates using patients improved significantly on all outcome measures in elderly individuals. In the conventional group, although improvements were seen on all subscales, they were less than those in pilates group.

In the present study, conventional exercises were found to have less changes in proprioception. In contrast, improvements in all variables were found to be significant for both Groups.

The positive effects of Pilates exercise have been emphasized by many studies. Bird *et al.* (2012) studied the effects of Pilates-based exercise on dynamic balance in older adults in residential communities (aged >60y) and found that participation in the Pilates component of the study for 5 weeks led to improved static and dynamic balance, although no significant differences were found between the pre- and post-test scores of the Pilates and exercise groups¹⁴.

In the present study, the number of falls and dynamic balance decreased in both groups participating in exercise program. Ata *et al.* (2013) also studied a group of 35 older adults (aged 61-87 years) who participated in 8-week, Pilates-based exercise program. A comparison of pre- and post-scores for Timed Up and Go (TUG), Forward Reach Test, Turn 180 Test, number of falls, fear of falling and perceptions of Pilates indicate that participants had a positive perception of the Pilates program and that their fear of falling decreased following the program. In line with these findings, the present study found that fear of falling decreased after exercise among the Pilates group along with the conventional group. Training was found to have a positive effect on dynamic balance, proprioception and number of falls, indicating that remaining physically active will help to decrease falls and maintain independence among the elderly.

There are limited number of studies about effect of Pilates in elderly people for proprioception. So this present study

supports that Pilates exercises can improve proprioception in elderly individuals, compared to conventional exercise programme.

This study provides the controlled evaluation of the effects of 8 weeks of Pilates and Conventional exercise programme on dynamic balance, fear of fall and proprioception in elderly individuals.

CONCLUSION

The results of this study shows that both Pilates as well as Conventional balance training program leads to significant improvement in fear of fall, dynamic balance and proprioception in elderly individuals. However, Pilates intervention is found to have greater benefits compared to the conventional balance intervention for proprioception. Thus Pilates can be incorporated with other physical exercises aimed to improve functional outcome and QOL in the elderly individuals who can help them to age gracefully and enjoy a healthy quality of life.

Limitations of the Study

It was done only on small sample size, the results could not be generalized to the entire elderly population who has increased risk of falls. It was not possible to blind participants to the intervention. There was also practical difficulty while delivering the interventions at different old age homes which may not be feasible in a non-research set-up. The total study duration was short. Along with this we failed to take follow up of the interventions

Scope for Further Studies

Future research with large sample size may be conducted to determine the effectiveness of the exercise programme between pilates and conventional therapy. Further controlled comparative studies with blinding of the samples and follow up are recommended in community dwelling old elderly individuals.

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