



**THE EFFECTIVENESS OF A TAILOR MADE EXERCISE PROTOCOL IN REDUCING
THE RISK OF FALLS IN COMMUNITY DWELLING ELDERLY – AN EXPERIMENTAL
STUDY**

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Article Received on 14/10/2022

Article Revised on 04/11/2022

Article Accepted on 24/11/2022

ABSTRACT

Background: Older persons fall often. Approximately 30% of the community dwelling persons aged 65 and older fall at least once per year and about 15% fall two or more times per year. Falls may have serious consequences, such as injury and disability that are major threat to the independence and well-being of older adults. Moreover, fall-related injuries rank as the third leading cause of years lived with disability according to the WHO report.

Methodology: 30 subjects above the age of 65 years were assessed and selected for the study who satisfies the inclusion criteria. All the subjects were assessed using Berg Balance Scale (BBS) to obtain the pretest value. A tailor made exercise protocol were given to all the subjects for a period of 3 months. The protocol was administered 5 days a week each session lasts for 40 minutes. After 12 weeks all subjects were reassessed using BBS to obtain the posttest value. **Result:** The result were analyzed using paired t-test. The significance level was $p < 0.001$.

Conclusion: The study proves tailor made exercise as an effective treatment in reducing the risk of falls in community dwelling elderly. It helps in improving strength, flexibility, endurance and joint range of motion.

KEYWORDS: Tailor made exercise protocol, Risk of fall, Community dwelling elderly.

INTRODUCTION

A fall happens when a subject unintentionally come to rest on the ground or at some other lower level, not as a result of a major intrinsic event Eg- stroke, syncope. (Tinetti et.al 1988).

Fall contribute to a large amount of injury to the elderly and can affect their confidence. Falls are common, disabling and frequently fatal events affecting between 30% and 50% of older individuals annually (S W parry et.al BMJ-2000). Even minor falls can have significant consequences for an older person, such as on-going fear of falling and loss of confidence in moving around safely, or a reduction in mobility which can lead to social isolation and depression. All these can impact on the independence and control an older person has over their life. In addition osteoporosis, a condition characterized by a reduction in bone mass and density increases the risk of fracture when an older person falls (CSP Fall Audit-2000).

So it is necessary to bring a suitable and effective intervention to reduce the risk of falls and fall related injuries in the elderly who live in the community. Exercise has convincing evidence in reducing the risk of falls in elderly, and can be done at any time and in any

place. So it is a very effective tool in reducing falls in the community. Fear of falling can lead to activity restriction that is self-imposed rather than due to actual physical impairments. (Liu- Ambrose et.al -2004).

There is now good evidence that multifactorial interventions conducted by health professionals with skills in geriatric medicine can prevent falls. Multifaceted interventions have generally been consistent in showing an effect, particularly if they are targeting persons at risk and include several intervention approaches. Falls among the elderly represent a major economic and social problem. Falls themselves and the belief that one might fall in fall risk situations can result in restriction of mobility and activity, feeling of helplessness, loss of confidence depression and institutionalization. (Lindy Clemson et.al 2004).

For several years now, it has been clear that exercise can modify key falls risk factors such as decreased muscle strength, reduced speed and poor balance in older people. There is now good evidence that exercise can reduce the incidence of falls themselves. Interestingly the interventions shown to be effectively involved exercise regime, including tai-chi, supervised strength and

endurance training and home exercise prescribed by a physiotherapist (Stephen R .Lord et.al 2003).

Interventions to prevent falls in older adults are effective in reducing both the risk of falling. Exercise programs were also effective in reducing the risk of falling. (John T Chang et.al).

Considering the above mentioned data exercise has shown to reduce falls in the elderly Though fall factors include lack of precious physician activity and functional limitations, a well-balanced and properly scheduled protocol can help reduce falls to a considerable extent.

Need of the Study

Falling by elderly people constitutes a serious issue with potential consequences of injury, disability and challenges to independence. Interventions aimed at reducing falls by improving physical abilities are widely reported. Current evidence suggests that intervention programs matched to the elderly individual's risk profile, including exercise for strength, balance, and gait problems can result in significant fall reduction (Annettee Piotrowski Brown- 1999).

Falls are the primary etiology of accidental deaths in those older than 65 years and falls are responsible for 70% of accidental deaths in people older than 75 years. However the highest rate of death after a fall is in white men older than 85 years. These findings support an overwhelming need for fall prevention and education to optimize rehabilitation management in the geriatric population.

Methodology

Pre- test and Post - test trail - Experimental study.

Sampling technique

Simple random sampling

Sample size

30 subjects.

Study duration

Total study duration- 06 months.

Interventional period – 03 months.

Study setting

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Inclusion criteria

Both males and females are selected

Age above 65 years.

BBS scale score between 45 & 50.

Exclusion criteria

CVA Patients

Persons using crutches or dependent on walking frame.

Amputees

Non cooperative

Persons having visual impairments

patients having neurological disorders.

Persons having congenital anomalies of upper limb and lower limb.

Tools and Materials Required

Wands

Weighted cuffs

Armless chairs

Standard arm Chair

Stop Watch

Inch tape.

Tailor made exercise protocol.

The tailor made exercise protocol was validated by 10 eminent Professionals in the field.

The new tailor made protocol consist of 16 different types of exercises which will improve the muscle strength & flexibility, increased range of motion and static & dynamic Balance.

The new tailor exercise protocol is as follows.

1. Head Turns

Purpose: To Promote neck flexibility

Position of the patient: Sitting

Method: Turn head slowly side to side

Repeat 10 times.

2. Slouch / Arch

Purpose: To produce awareness of good sitting posture and assist in trunk flexibility

Position of the patient: Sitting

Method: slouch forward in a flexed posture and then arch backward to create a curve in lower back

Repeat: 10 repetitions *3 sets. Allow 1 minute interval between sets.

3. Wand Exercises

Purpose: To Promote shoulder flexibility

Position of the patient: Sitting

Method: Grasp cane with both hand and lift overhead, then lower it back to subjects lap.

Repeat: 10 repetitions * 3 sets. Allow 1 minute interval between sets.

4. Knee kicks.

Purpose: To Promote knee mobility and leg strength

Position of the patient: Sitting

Method: kick leg straight out in front of the subject making sure the knee is completely straight. Weight cuff can be tied on the ankle for added resistance.

Repeat: with each leg 10 repetitions * 3 sets. Allow 1 minute interval between sets.

5. Half squats

Purpose: To strengthen the thigh muscles and to develop overall strength.

Position of the patient: Sitting.

Method: sit on chair, then up. Clasp hands in front of the subject. Tie weighted cuffs on hands for added resistance and balancing effect.

Repeat: 05 times increase 1 time each week * 3 sets. Allow 1 minute interval between sets.

6. Crunches

Purpose: To strengthen the abdominal muscles, especially the upper abdomen

Position of the patient: Supine

Method: bend subject's knees, clasp fingers behind subjects head, try coming up as much as they can, then lie down flat on their back.

Repeat: 50 times.

7. Alternate knee to chest.

Purpose: To promote flexibility and strength in lower back and hips.

Position of the patient: Supine

Method: Raise bend knee up to the chest. Try touching the chest using knees.

Repeat: For each leg. 10 times *3 sets. Allow 1 minute interval between sets

10 times *3 sets. Allow 1 minute interval between sets.

8. Bridging.

Purpose: To promote flexibility and strength in lower back muscles

Position of the patient: Supine

Method: Place feet flat on bed with knees bent. Raise hips off surface as high as possible

Repeat: 10 times. 10 seconds each repetition.

9. Hip rolls.

Purpose: To promote hip flexibility and trunk controls

Position of the patient: Supine

Method: Lie on flat surface, place feet flat on surface with knees bent, roll knees side to side as far as possible.

Repeat: 15 repetition.

10. Lateral Raises.

Purpose: To strengthen the hip abductors.

Position of the patient: side lying

Method: Lie on sides and lift subjects leg as much as he can do

Repeat: 10 repetition *3 sets

11. Toe raises.

Purpose: To strengthen the calf muscles

Position of the patient: standing

Method: Hold on the back of chair for support, raise heel 20 times

Repeat: *3 sets, Allow 1 minute interval between sets.

12. Quadriceps stretch

Purpose: To stretch the quadriceps muscle.

Position of the patient: Long sitting

Method: Lean with back on a wall. Then slide down slowly, then at half standing position hold for 20 seconds .feel a stretch on front of thigh.

Repeat: *3 sets.

13. Hamstring stretch.

Purpose: To promote knee flexibility and good standing posture.

Position of the patient: sitting

Method: Place 1 leg on a small stool with the other foot flat on the floor. Place hands on knee and lean forward, feeling stretch in the back of knee. Hold for 25 seconds.

Repeat: Each leg 3 times.

14. Calf stretch.

Purpose: To stretch the calf muscles

Position of the patient: Standing

Method: Hold chair for support, place 1 foot forward, then bent at knees keeping back heel flat on the floor. Feel a stretch in back of calf muscles.

Repeat: hold for 25 seconds * 3 times.

15. Tandem Walking

Purpose: To improve dynamic balance

Position of the patient: walking with eyes open.

Method: The patient is asked to walk in a straight line using tandem gait. Walking where the toes of the back foot touch the heel of the front foot at each step. (20 meters)

Repeat: 3 times.

16. Single leg stance.

Purpose: To improve static postural & balance control.

Position of the patient: on single leg stance with eyes open

Method: The patient is asked to stand on single leg for 03 seconds.

Repeat: 3 times.

Procedure

Total study duration was 06 months. .Interventional period was 03 months. A total of 120 elderly persons were assessed and a sample of 30 subjects were taken into the study satisfying the inclusion and exclusion criteria after getting consent from each of them. To maintain the homogeneity in pre assessment of BBS score the selected 30 subjects were between 45 and 50 .The selected subjects were included in a single group – Experimental group. The pretest was done on day 1 using BBS score, after that the tailor made exercise protocol was administered to them for 05 days a week for 12 weeks. The duration of each session last for 45 minutes. The posttest was done on the end of 12th week. During this intervention period no other exercises other than this exercise protocol was given to the subjects.

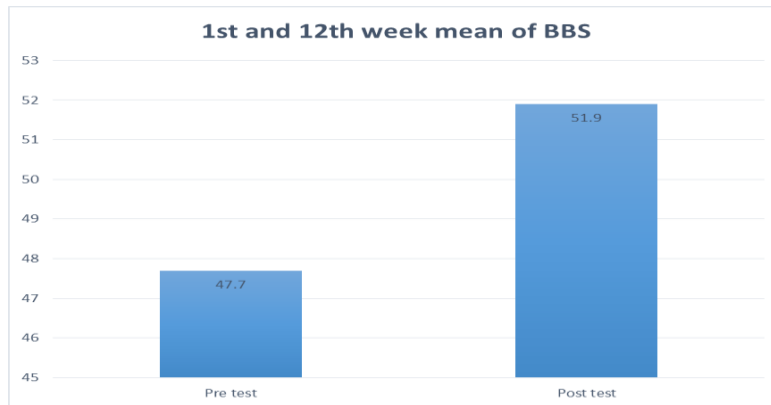
Outcome Measure

Berg Balance Scale (BBS)

Statistical Analysis & Interpretations

Berg Balance Scale – The level of Significance.

Sl. No.	Test	Mean	Mean difference	Standard deviation	Paired t test	Level of significance
1	PRE TEST	47.7	4.2	2.99	5.44	P<0.001
2	POST TEST	51.9				



The above table shows mean, standard deviation, t value and level of significance of patients assessed using the Berg Balance Scale before and after administrating the tailor made exercise protocol to the 30 subjects.

The pretest mean was 47.7 and the posttest mean was 51.9, the pre Vs post mean was 4.2 which shows that the exercise protocol was effective in reducing the risk of fall and improved balance considerably in the group.

The level of significance was $p < 0.001$.

DISCUSSION

The significant improvement in the BBS Scores are due to the improvement in muscle strength & flexibility, increased range of motion and static & dynamic Balance.

Flexibility is the ability of a joint or series of joints to move through an unrestricted, pain free range of motion. Many variables affect the loss of normal joint flexibility including injury, inactivity or a lack of stretching. The range of motion will be influenced by the mobility of the soft tissue that surround the joint. These soft tissues include muscles, ligaments, tendons, joint capsules and skin. Stretching exercises are typically performed to increase flexibility and to allow improved joint range of motion. Common forms of stretching includes static stretch, proprioceptive neuromuscular facilitation, ballistic stretch and dynamic stretch. All these stretching exercises can improve flexibility. Flexibility exercises used to improve Range of motion.

Range of motion exercises refers to activity aimed at improving movements of a specific joint. This motion is influenced by several structures, configuration of bone surfaces within the joint, joint capsule, ligaments, tendons and muscles acting on the joint.

Range of motion exercises can increase movement at a joint, improvement movement efficiency, increase independence, decrease pain, improve and maintain joint integrity. Joints maintain a balance range of motion by regular use and stretching of the surrounding soft tissues, just 10 minutes of stretching three times a week can help to improve range of motion.

Flexibility training interventions in older adults are often effective at increasing joint range of motion in various joints and various functional outcomes can be improved. However older adults are not overly concerned with high performance benefits from increased flexibility and more focused on being safely active and safely performing activities of daily living. Injury and fall prevention are also common motives for recommending flexibility training to older adults. Flexibility training may enhance postural stability and balance when combined with resistance training.

Balance training involves doing exercises that strengthen the muscles that helps keeping individuals upright, including legs and core. These kinds of exercises can improve stability and help to prevent falls. Balance training is undertaken in order to prevent falls/ injury, improve posture, and improve strength. Improve dynamic trunk control, sitting & standing balance, mobility in patients too. Strengthen self –efficacy in balance control leading to improved fall-related self – efficacy, reduce fear of falling, increased walking speed and improved physical function. Older adults be exposed to a program that includes flexibility and balance exercises for 2-3 session each week ,for period of at least 8 weeks ,as a tool for quality of life improvement. Exercises that improves balance can help prevent falls, a common problem in older population.

Strength of the Study

- To find out the effect of exercise on reducing risk of falls in the elderly.

- To quantify the improvement brought by the tailor made exercise protocol by assessing the frequency of falls after completion of the scheduled program.
- To create an awareness about the benefits of physical exercise in reducing falls and in promoting fitness.
- To improve the quality of life and to make ADL easier for elderly patients.

Limitations of the Study

This study assessed only short term progress of the patient. Long term follow up is needed to evaluate the difference in condition of the patient from the current status.

All measurements were taken manually and this may introduce human error, which could threat the study reliability.

No follow could be done.

Lack of control group.

Suggestions

Further controlled studies on larger samples should be conducted.

Training should be given in various environmental conditions.

Further research which includes progressive resisted exercise should be included.

Conclusion

This study proves tailor made exercises as an effective treatment in reducing the risk of falls in community dwelling elderly. It helps in improving strength, flexibility, range of motion and static and dynamic balance. In this context exercises are considered as an essential component in reducing fall and preventing the secondary problems due to fall injuries. It is simple to practice and is cost effective adjunct to physiotherapy in fall prevention.

Source of Funding

Self.

Ethical Clearance

Approved by the instructional ethics committee of Mid-Town Medical Centre, Kochi held on 28/01/2022 with Ref. no. MMC/ CT/ EC/ 06/22.

Acknowledgement: None

Conflict of interest: None.

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