



EFFECT OF CoDuSe EXERCISE ON FUNCTIONAL BALANCE IN ELDERLY POPULATION- AN EXPERIMENTAL STUDY

¹ Shreya Ramteke, ²Drashti Niket Shah

¹Intern, College of physiotherapy, MMC, Wanless Hospital, Miraj, Maharashtra, India,

²Assistant Professor, College of physiotherapy, MMC, Wanless Hospital, Miraj, Maharashtra, India.

ABSTRACT

Background: According to WHO the population of 60 years and above is known to be the elderly population. Aging is defined as a physiological process which is accompanied by functional, biochemical and psychological changes. General problems seen in the elderly are musculoskeletal disorders like osteoarthritis, rheumatoid arthritis; neurological disorders like stroke, Parkinson's disease, psychological disorders, cognitive disorders, balance disorders. Among all these, balance disorders leading to fall is common in elderly population. More than 90% of the fractures and other casualties occur due to fall and most of these occur in persons of more than 65 years of age. Also impaired core strength, dual tasking and sensory strategy impose risk of fall in the elderly population. Since falling caused by loss of balance proves a threat to the lives of elderly people, prevention of fall in the elderly is the best treatment. CoDuSe exercise which is built on core stability in combination with dual tasking and sensory strategy was performed on multiple sclerosis patients, did not only improve balance but also reduced the number of falls.

Aim: The aim of the study is to study the effect of CoDuSe exercise on functional balance in elderly population.

Method: 33 subjects of age 60-74 years, both male and female will be taken. The subject should have mini-mental scale examination score of atleast 24. Pre-test assessment will be taken by Berg Balance Scale and Modified Clinical test for Sensory Integration and Balance. The subjects will be given CoDuSe exercise which is a combination of core strengthening, dual tasking and sensory strategy for 15 minutes each with 1minute break. Each exercise will have 3 repetitions. Then post-test assessment will be taken again by Berg Balance Scale and Modified Clinical test for Sensory Integration and balance.

OUTCOME MEASURES: -

Berg Balance Scale

Modified Clinical test for Sensory Integration and Balance.

Result:

Among the 33 participants taken between the age group of 60-74 years of age, we see that, core strengthening along with dual tasking and sensory strategy known as CoDuSe exercise has significant effect on improving the functional balance.

Conclusion:

Therefore, the study concluded that CoDuSe exercise plays a significant role in improving the functional balance in elderly population.

Keywords: CoDuSe exercise, Balance, core strengthening, dual tasking, sensory strategy

INTRODUCTION

Aging is defined as a physiological process which is accompanied by functional, biochemical and psychological changes.^[1] Aging is associated with loss in muscle strength which is a limited factor in daily activities, but aging is at the same time associated with loss of peripheral motor and sensory nerves^[2-3], loss of vision and control of eyes through vestibular and visual cortex^[4], increase in blood pressure while performing exercise.^[5] General problems seen in elderly are musculoskeletal disorders like osteoarthritis, rheumatoid arthritis; cardio respiratory disorders like acute Myocardial infarction, asthma; neurological disorders like stroke, Parkinson's disease, psychological disorders, cognitive disorders, balance disorders.^[6-10]

Among all these balance disorders leading to falls is common in elderly population.^[11] It was seen that, prevalence of fall in Indian older adults above 60 years is about 14-53%^[12]

It is seen in the general community, 1 in 3 elderlies above 65 years of age and 1 in 2 elderlies above 80 years of age are seen to experience falling at least once in a year by average; only 5% are seen to cause serious damage.^[13]

Studies have shown that, there is a significant effect of core stabilizing exercises on balance^[14] and ADLs in the geriatric group are affected due to the weakness of core muscles like the rectus abdominis and the internal and external oblique muscles.^[15]

Also impaired dual tasking and sensory strategy impose risk of fall in the elderly population.^[16] Since falling caused by loss of balance proves a threat to the lives of elderly people, prevention of fall in the elderly is the best treatment.^[17]

Previous studies of balance training showed differences in the result and content which were not conclusive.^[18]

Balance function can improve by specific exercises, thus reducing fall frequency.^[19] CoDuSe exercise which is built on core stability in combination with dual tasking and sensory strategy was performed on multiple sclerosis patients, did not only improve balance but also reduced the number of falls.^[20] The aim of the program was to target important factors which help in maintaining balance while performing activities; trunk stability, dual tasking, and sensory strategy.^[21] Recently, CoDuSe exercise was performed on Multiple Sclerosis patients in whom balance is affected and the exercise proved to be effective in improving balance.^[22]

Studies proved that CoDuSe exercise improves dynamic balance more than any intervention can. This exercise program usually targets visual, somatosensory, and vestibular aspects of balance.^[23]

Thus, the aim of the study is to find an effective technique to improve functional balance in elderly population.

AIM

The aim of the study is to study the effect of CoDuSe exercise on functional balance in elderly population.

OBJECTIVES

To find out the effect of core strengthening in CoDuSe exercise on functional balance in elderly population.

To find out the effect of dual tasking in CoDuSe exercise on functional balance in elderly population.

To find out the effect of sensory strategy in CoDuSe exercise on functional balance in elderly population

METHODOLOGY

- STUDY TYPE- Experimental study
- STUDY SETTING - old age homes, Miraj
- STUDY DURATION- 4 weeks
- STUDY DESIGN -Pre and Post Experimental study
- TYPE OF SAMPLING- Purposive sampling
- SAMPLE SIZE- 33

V. MATERIALS

- Mat
- Tray
- Balls
- Shopping bags
- Pillows/cushions
- Chair

I. INCLUSION CRITERIA

- Subjects of age 60-74 years.
- Gender – male and female.
- Patients meeting the fitness criteria i.e., patient should be able to do atleast 30 mins of aerobic exercise and strength training exercise 2-3 days a week
- Independent walking.
- Mini-mental scale examination score atleast 24.
- Berg balance scale- moderate fall risk.
- Patient willing to perform the exercise.

I. EXCLUSION CRITERIA

- Subjects with history of impairment of hip, and knees, recent fracture or any injury to the lower limb.
- Inflammatory condition of the lower limb.
- Previous surgery to the spine or the lower limb.
- H/O trauma due to falls in the last few years.
- Extreme pain lower limb.
- Subjects with cardio-respiratory disorder.
- Subjects with neurological disorder.
- Any other musculoskeletal problem interfering with the capacity to maintain an upright stance or to stand up from and sit down onto the chair.
- Subjects not willing to give the consent for exercise

I. PROCEDURE

- Ethical clearance will be taken from the Institutional Ethical Committee.
- Subjects will be selected according to inclusion criteria.
- Prior to study subjects were explained procedure in vernacular language.
- A written informed consent will be taken from the subjects prior to the intervention.
- A pre-intervention analysis will be done using Berg Balance Scale (BBS) and Modified Clinical Test for Sensory integration and balance (MTCSIB)
- Patients will be then asked to perform CoDuSe exercise for 45 mins per day for a period of 4 weeks 3 times in a week.
- A post-intervention analysis will be done using the BBS and the MTCSIB scales.

STUDY PROTOCOL

CoDuSe exercise

CORE STABILITY

IN SUPINE POSITION (KNEES BENT)

1. Alternately sliding one heel forward to straighten the leg. Repeat with other leg. Repetitions 2-3 times



2. Alternately lifting one foot off the floor. Repeat with other leg. Repetitions 2-3 times
3. Lifting both the legs towards the trunk and back. repetitions 2-3 times
4. Bridging by lifting the bottom and spine off the mat. Repetitions 2-3 times

LYING ON ONE SIDE

1. Bent leg side lifts. Repeat on the other side. Repetitions 2-3 times



2. Straight leg side raise. Repeat on the other side. 2-3 times.

1. Weight shifting forward. Repetitions 2-3 times



2. Walking forward with hands. Repetitions 2-3 times
3. Sliding 1 foot in a straight line away from the body. Repeat with other e.g., Repetitions 2-3 times.
4. Straight leg lifts off the floor. Repeat with other leg. Repetitions 2-3 times
5. Diagonally straight arm and one leg lift. Repeat with opposite limbs. Repetitions 2-3 times

Standing

Bending forward. Come back to original position and repeat 2-3 times.



(II) DUAL TASKING

In dual tasking, the subject is asked to perform two concurrent tasks at the same times.

1. Juggling a ball

While transferring from sitting to standing or while walking, using hands. Perform for 2-3 times

2. Holding a tray with balls in it. Do this while transferring or walking. Repeat 2-3 times.
3. Carrying shopping bags while walking or transferring. Do it 2-3 times
4. Walking: - while turning one's head, while counting or reciting days of the week in reverse order

(III) SENSORY STRATEGY

1. Standing on one foot

Ask the patient to stand for 15 secs. Repeat 2-3 times.

2. Tandem standing

The patient places one foot in front of the other foot. Stay in the position for 15 secs. Repeat 2-3 times.

3. Walking while alternating knee lifts with each step.

Walk for a distance of 3 meters.

Repeat for 2-3 times.

4. Walking on pillows or cushions

The patient walks on pillows or cushions placed in his way. Repeat 2-3 times.

5. Play Simon's

Stand on one leg and touch your nose. Ask the patient to do various things in this position. Repeat 2-3 times.

STATISTICAL ANALYSIS

Statistical analysis was performed using Statistical Package for the Social Sciences [SPSS] software 23. The level of significance for Pre and Post BBS and MCTSIB for within the group was done using paired-t-test.

RESULTS

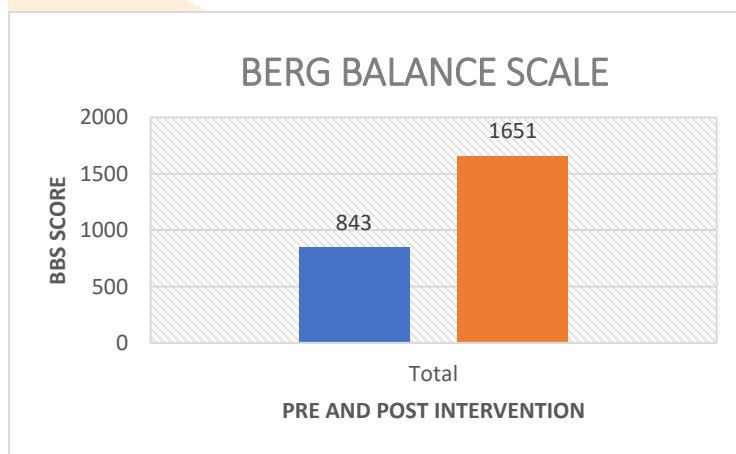
Data analysis was performed using Statistical Package for the Social Sciences [SPSS] software.

TABLE NO. 1 SIGNIFICANT DIFFERENCE IN MEAN BY USING BBS AND MCTSIB

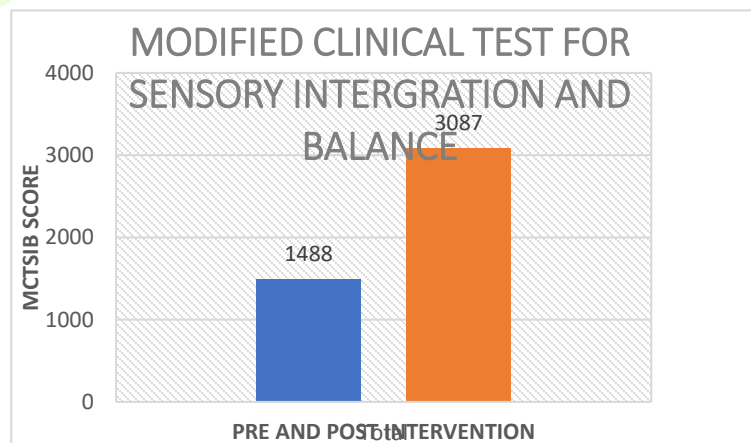
OUTCOME MEASURE	PRE-TEST MEAN VALUE	POST-TEST MEAN VALUE
BBS	26.2	51.5
MTCSIB	46.4	96.4

TABLE NO. 2 SIGNIFICANT DIFFERENCE IN t-stat and p-value BY USING BBS AND MCTSIB

OUTCOME MEASURE	PRE-TEST t VALUE	POST-TEST VALUE	t	PRE-TEST p VALUE	POST TEST p VALUE
BBS	0.26	2.21		0.79	0.03
MCTSIB	3.05	2.56		0.004	0.01



GRAPH NO. 1 SHOWS PRE AND POST INTERVENTION DIFFERENCE USING BBS



GRAPH NO. 2 SHOWS PRE AND POST INTERVENTION DIFFERENCE USING MCTSIB

Result From analysis:

On an average, there is increase in the mean value of Berg Balance scale (BBS) and Modified Clinical Test for Sensory Integration and Balance (MCTSIB), pre and post intervention.

When compared between both the scales, Modified Clinical Test for Sensory Integration and Balance (MCTSIB) shows more significant difference in the p value (0.01) than Berg Balance Scale (0.03).

P-value of both the scales is less than 5% which is the level of significance. In other words, we can accept alternative hypothesis.

DISCUSSION

Good balance is an important skill that requires integration of sensory information regarding the position of body in relation to the surrounding and the ability to generate appropriate motor response to control the body movements. Balance depends upon contribution from vision, vestibular sense, proprioception, muscle strength and reaction time. As there is aging, there is loss of balance function through loss of sensory elements, ability to integrate information, and also because of loss of musculoskeletal function. Falls can lead to a decline in the function and the independence and are the leading cause of injuries in the elderly population.

CoDuSe balance group exercise programme improves balance, as measured using BBS. It also reduces the number of falls and near falls.

The CoDuSe exercise programme has led to reduction in falls, as falls can lead to serious injuries. CoDuSe encourages the awareness of trunk stability and mindful movements resulting in moving slower than moving faster. BBS contains the items that challenges both static and dynamic balance and is considered as more appropriate as primary outcome.

Also, the purpose of using Modified Clinical test for Sensory Integration and balance is that, it was designed to assess how well an older adult is using sensory inputs when one or sensory inputs is compromised.

As balance is impaired in elderly population due to various reasons, it is important to reduce the risk of falls, as falls can lead to serious injuries. It is important to design a protocol which mainly focuses on core strength, as decrease in the core strength is one of the main reasons for impaired balance. So, in this study, we examined the elderly individuals of aged 60-74 years of age who had balance problems. Pre and post intervention was done using BBS and MCTSIB. In these 33 subjects were taken and the protocol was given for 3 times in a week for a duration of 4 weeks. We found out that, the CoDuSe exercise programme proved to be effective in improving functional balance in elderly population.

Amrita Ghosh et.al (2019) did a study on 30 multiple sclerosis patients who were divided in two groups, Group A and Group B. Group A was given CoDuSe exercise while Group B was given exergaming exercises for a period of 6 weeks. It was found that Group A who received CoDuSe exercise had significant improvement in balance and fear of fall than Group B who received Exergaming exercises.

Also, in a study done by Jerrold S. Petrofsky et al (2005), where 6 secs Abs machine was used to improve the core strength in elderly patients. It was proved in this study that, increasing the core strength thus led to improvement in balance.

This study is useful in creating a significant improvement in functional balance in the elderly population and thus can be used as an effective method to treat balance problems and recovery of patients.

CONCLUSION

The findings of this study are important, as the protocol designed of CoDuSe has been proved to be much effective in improving the balance of elderly population. The exercise programme mainly focuses on improving the core strength along with dual tasking and sensory strategy. Dual tasking included focusing mainly on involving the core and carrying out some activity at the same time. Sensory strategy includes carrying out activity which mainly focused on the proprioception which equally important for maintaining balance. CoDuSe exercise which was earlier given in the multiple sclerosis patients for balance proved to be much effective. As the elderly population is affected too with balance it is important to design a protocol which will prove to be effective in improving balance and be less tiring to them.

The p values of the study are 0.03 and 0.01 of BBS and MCTSIB respectively, which is less than 5% level of significance. So, taking this into consideration there is increase in the values of BBS and MCRSIB pre and post intervention. Therefore, the study concluded that, there is significant effect of CoDuSe exercise on functional balance in the elderly population.

LIMITATIONS AND SUGGESTIONS**LIMITATIONS**

the study involves only the age group between 60-74 years, people of elderly age group can be taken.

The study is done on a smaller sample size

More outcome measures related to balance and fall related to the elderly population can be taken.

SUGGESTIONS

Comparative study can be done between CoDuSe exercise and some other study.

Elderly population with some specific condition which cause falls can be taken.

REFERENCES

1. Desa UN. United Nations Department of Economic and Social Affairs. Population Division: World Population Prospects: The. 2008.
2. Resnick HE, Vinik AI, Schwartz AV, Leveille SG, Brancati FL, Balfour J, Guralnik JM. Independent effects of peripheral nerve dysfunction on lower-extremity physical function in old age: the Women's Health and Aging Study. *Diabetes care*. 2000 Nov 1;23(11):1642-7.
3. Resnick HE, Stansberry KB, Harris TB, Tirivedi M, Smith K, Morgan P, Vinik AI. Diabetes, peripheral neuropathy, and old age disability. *Muscle & Nerve: Official Journal of the American Association of Electrodiagnostic Medicine*. 2002 Jan;25(1):43-50.
4. Hof PR, Morrison JH. The aging brain: morphomolecular senescence of cortical circuits. *Trends in neurosciences*. 2004 Oct 1;27(10):607-13.
5. West CG, Gildengorin G, Haegerstrom-Portnoy G, Schneck ME, Lott L, Brabyn JA. Is vision function related to physical functional ability in older adults? *Journal of the American Geriatrics Society*. 2002 Jan 1;50(1):136-45.
6. Dhargave P, Sendhilkumar R. Prevalence of risk factors for falls among elderly people living in long-term care homes. *Journal of clinical gerontology and geriatrics*. 2016 Sep 1;7(3):99-103.
7. Dsouza SA, Rajashekar B, Dsouza HS, Kumar KB. Falls in Indian older adults: a barrier to active ageing. *Asian J Gerontol Geriatr*. 2014 Jun;9(1):1-8.
8. Choi SH, Lim JH, Cho HY. The effects of trunk stabilization exercise using Swiss ball and core stabilization exercise on balance and gait in elderly women. *Journal of Korean Society of Physical Medicine*. 2012 Feb 29;7(1):49-58.
9. Wollesen B, Schulz S, Seydell L, Delbaere K. Does dual task training improve walking performance of older adults with concern of falling? *BMC geriatrics*. 2017 Dec;17(1):1-9.

10. Sherrington C, Tiedemann A, Fairhall N, Close JC, Lord SR. Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations. *New South Wales public health bulletin*. 2011 Jun 2;22(4):78-83.
11. Dsouza SA, Rajashekar B, Dsouza HS, Kumar KB. Falls in Indian older adults: a barrier to active ageing. *Asian J Gerontol Geriatr*. 2014 Jun;9(1):1-8.
12. Osoba MY, Rao AK, Agrawal SK, Lalwani AK. Balance and gait in the elderly: A contemporary review. *Laryngoscope investigative otolaryngology*. 2019 Feb;4(1):143-53.
13. Barusch AS. Problems and coping strategies of elderly spouse caregivers. *The Gerontologist*. 1988 Oct 1;28(5):677-85.
14. Tiwari S, Sinha AK, Patwardhan K, Gehlot S, Gambhir IS, Mohapatra SC. Prevalence of health problems among elderly: A study in a rural population of Varanasi. *Indian J Prev Soc Med*. 2010 Jul;41(3):226-30.
15. Multani NK, Verma SK. Principles of geriatric physiotherapy. JAYPEE BROTHERS PUBLISHERS; 2008.
16. Stevens JA, Olson S. Reducing falls and resulting hip fractures among older women. *Home care provider*. 2000 Aug 1;5(4):134-41.
17. Jensen J, Nyberg L, Rosendahl E, Gustafson Y, Lundin-Olsson L. Effects of a fall prevention program including exercise on mobility and falls in frail older people living in residential care facilities. *Aging clinical and experimental research*. 2004 Aug;16(4):283-92.
18. Petrofsky JS, Cuneo M, Dial R, Pawley AK, Hill J. Core strengthening and balance in the geriatric population. *Journal of Applied Research in Clinical and Experimental Therapeutics*. 2005 Nov 1;5(3):423.
19. Rusko H, Rahkila P, Karvinen E. Anaerobic threshold, skeletal muscle enzymes and fiber composition in young female cross-country skiers. *Acta physiologica scandinavica*. 1980 Mar;108(3):263-8.
20. Carling A, Forsberg A, Gunnarsson M, Nilsagård Y. CoDuSe group exercise programme improves balance and reduces falls in people with multiple sclerosis: A multi-centre, randomized, controlled pilot study. *Multiple Sclerosis Journal*. 2017 Sep;23(10):1394-404.
21. Petrofsky JS, Cuneo M, Dial R, Pawley AK, Hill J. Core strengthening and balance in the geriatric population. *Journal of Applied Research in Clinical and Experimental Therapeutics*. 2005 Nov 1;5(3):423.
22. Dhargave P, Sendhilkumar R. Prevalence of risk factors for falls among elderly people living in long-term care homes. *Journal of clinical gerontology and geriatrics*. 2016 Sep 1;7(3):99-103.
23. Ghosh A. Effect of Coduse Vs Exergaming Exercise to Improve Balance in Multiple Sclerosis Patients: A Comparative Study.

