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EFFECTS OF DUAL TASK TRAINING ON BALANCE AND GAIT ABILITY IN GERIATRIC POPULATION.

AUTHOR(S)

Mansi Gupta, Vidhi Singh

ABSTRACT

Background and Objectives

With ageing, various systems of the body weaken such as, musculoskeletal, cardiovascular, neuromuscular etc. It also impairs visual, auditory and somatosensory input, which results in reduction of environmental perception and precision of movement. Geriatric population requires physical exercises and various interventions that help to improve their balance, coordination, range of motion, strength, endurance and gait function. The study is picked to overcome the research gap that, the previous studies did not include the quantitative measurement of gait parameters while assessing the effect of dual task training on balance and gait ability, specifically in geriatric population. So the need of the study is to evaluate the effectiveness of dual task training on balance as well as gait ability in geriatric population.

Methods

60 subjects were recruited in the study based on inclusion and exclusion criteria. Subjects are randomly allocated in two groups Group A known as Experimental Group received Fixed priority training and Group B known as Controlled Group received Variable priority training. Parametric test was used to judge the statistical difference. Convenience Sample was done.

Result

Both the groups were significant but there was no statistical significant difference between the groups for two variables, the significant difference was seen within the groups.

Conclusion

Experimental Group- fixed priority training and Controlled Group-received priority training were found equally effective in controlling dual task training on balance and gait ability in geriatric population.

Keywords: Balance, Gait training and Co-ordination.

Introduction

Motor development have evolved with emphasis shifting from the biological maturational processes of motor development to different aspects of motor behavior over time. Movement skills are the foundation movements, or

precursor patterns, to more specialized, complex skills in games, sports, dance, and recreational activities Without competence in locomotor skills such as running, jumping and hopping, and object control skills such as kicking, catching, and throwing, individuals are less likely to access the range of physical activity options available to establish an active lifestyle [1]

The global population of age 60 year and older are considered in geriatric population. According to union health ministry, It would be double from 542 million in 1995 to 1.2 billion in 2025. In India geriatric population is rapidly growing. It led to many changes, fall is one of the major problem found in geriatric population and also termed as geriatric giants.[2]

Balance is defined as the ability to maintain the projection of the body's center of mass (CoM) within manageable limits of the base of support, as in standing or sitting, or in transit to a new base of support, as in walking, standing. The base of support is composed of the area between all points of contact of the body with another surface.[3]

Gait is a person's pattern of walking that involves balance and coordination of muscle so that body propelled forward in a rhythm. Gait is one of the keys to functional independence. For a long-time, walking was considered an automatic process involving minimal higher-level cognitive input, walking does not take place without muscles that move the limbs and the "lower-level" control that regulates the timely activation of the muscles. Gait is achieved by coordinated movements of body segments, taking advantage of an interaction between internal and external factors, and is accomplished through the action of the neuromusculoskeletal system. Normal gait is both stable and flexible, allowing for changes in speed and maneuvering in different terrains while maintaining energetic efficiency.[4]

Dual task training can be defined as performing two activity simultaneously together with coordination. reduced fall rate and fear of falling substantially. Only strength-balance-cognitive training reduced dual task costs of walking and improved gait initiation, and divided attention was merely improved by the cognitive-motor group. The larger improvements in divided attention and dual task walking highlight that an exercise program aiming at improving tasks that require attentional control should include a cognitive challenging element.[7]

Elaheh Azadian et.Al. in 2013 in their study of The effect of dual task and executive training on pattern of gait in older adults with balance impairment: A Randomized controlled trial concluded that the EF (executive function) training may be a promising approach to fall prevention. The results show that EF training can

Effectiveness of dual task training is measured under fixed priority (FP) versus variable priority (VP). Fixed priority is the condition when subject is ask to maintain or fix the same amount of focus on both task through the activity. And variable priority is the condition where subject is ask to switch their attention more on one task in between the activity.[5]

Aims and Objectives

The aim of our study is to find out the effect of dual task training to improve balance and gait in geriatric population.

Objective

To find out the effectiveness of dual task training to improve balance ability in elderly.

To find out the effectiveness of dual task training to improve gait ability in elderly.

Review of literature of the study

Ebrahim Norouzi et.Al in 2019 in their study of Dual-task training on cognition and resistance training improved both balance and working memory in older people concluded that in male older adults, MCdtt(motor cognitive dual task training) has a more positive impact on working memory and balancing performance than MMdtt (motor motor dual task training). Notably, this impact was still apparent 12 weeks after completion of the intervention program. [6]

Eva van het Reve et. Al. in 2014 in their study of Strength-balance supplemented with computerized cognitive training to improve dual task gait and divided attention in older adults: a multicenter randomized-controlled trials concluded that Both strength-balance and strength-balance-cognitive training enhanced physical performance, reaction time executive functions, and

compete with physical exercise in this cohort of older adults. Overall, all training groups showed improvement in gait parameter especially on parameters that associated with fall risk such as single support time.[8]

Kazuki Uemura et.Al. in 2012 in their study of Effects of dual-task switch exercise on gait and gait initiation performance in older adults: Preliminary results of a randomized controlled trial concluded that This is the first study that examined the effect of a specific exercise targeting impaired gait initiation performance under the dual-task condition in older adults who were at high risk of falling. The results of the present study suggest that older adults are able to improve their gait initiation performance under the dual-task condition only.

Methodology

Study design- Experimental study Sampling – Convenient sampling

Statistical analysis- T test Outcome measures- FRT, TUG, FGA

Inclusion criteria

Age group between 60-70 years Both male and female individuals

Able to walk 10m with or without assistive device. Able to count from 100

Exclusion criteria

Any musculoskeletal injury disorder i.e. recent fracture, dislocation. Any neuromuscular disorders i.e. Parkinson's, Alzheimer's, dementia, spinal disorder, multiple sclerosis .Cardiac disease i.e. recent CHF (Congestive heart failure), MI (myocardial infarction) and Recent surgeries.

Materials to be used

Weighing machine,	Stopwatch	Measuring device for FGA marked area
10m Yard	Stadiometer	Inch tape
Marker pen	Cones.	

Research Hypothesis

Null Hypothesis

There is no significant effect of dual task training to improve balance ability in geriatric population. There is no significant effect of dual task training to improve gait ability in geriatric population

Alternate Hypothesis

There is a significant effect of dual task training to improve balance ability in geriatric population. There is a significant effect of dual task training to improve gait ability in geriatric population.

Variables

Independent variables

Height, Weight, BMI, Age, Gender

Dependent variables

TUG(Timed up and Go) Test, FRT(Functional reach test), FGA (Functional gait Assessment)

Testing procedure

An experimental study will be conducted for geriatric population at Institutionalized old age home in and around Mathura, Uttar Pradesh

By using convenient sampling technique, 60 participants of age 60-70 years will be selected who will meet with the inclusion criteria.

Prior to participation, inform consent form will be taken from each individual. The study will be thoroughly explained to all subjects.

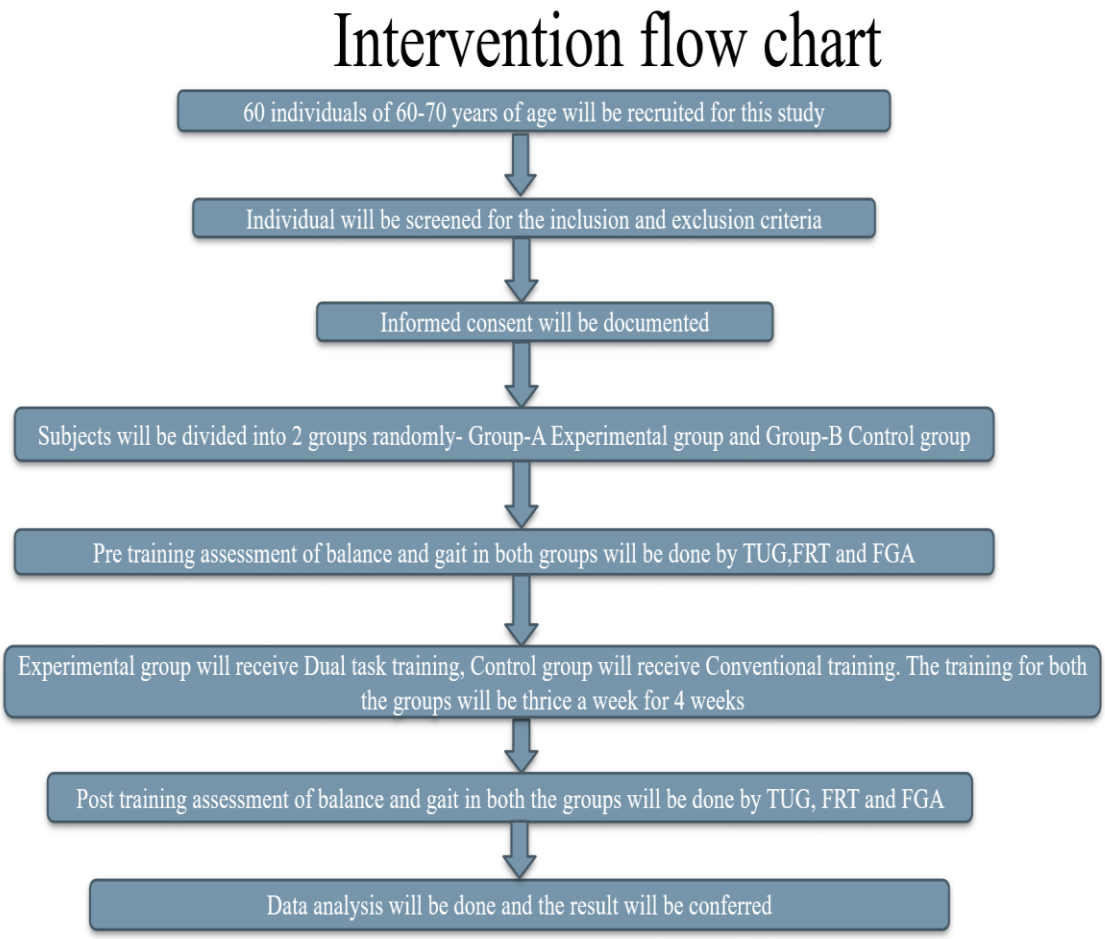
Before performing the dual task training, Pre assessment of balance and gait will be done with the help of TUG (Timed Up and Go) Test, FRT (Functional Reach Test), FGA (Functional Gait Assessment) from each subject.

60 individuals will be divided randomly into 2 groups. Experimental group (Group-A) and Controlled group (Group-B)

Both the groups will have a session of 45 minutes, 3 times in a week for 4 weeks.

After 4 weeks, post evaluation of gait and balance will be done with the help of TUG, FRT AND FGA. And the changes will be recorded carefully.

Experimental Group – Group A	Control Group – Group B
• 10 minutes of Warm up- Self stretching of Calf, Hamstrings, Quadriceps, Biceps, Triceps, Side bending, Side twisting, Marching 10 repetitions each • Gait training- 10m walk with backward counting from 100. • Comfortable speed 3 round with the rest period of 3 minutes. • After rest subjects will be instructed to clear the obstacles between walkway like cones, ropes, and wooden blocks without counting. • 05 minutes of Cool down- Relaxation and breathing exercises.	• 10 minutes of Warm up- Self stretching of Calf, Hamstrings, Quadriceps, Biceps, Triceps, Side bending • 10 minutes of Upper limb exercises- ROM exercises (shoulder flexion-extension, abduction adduction, biceps curl, elbow extension, forearm pronation- supination, wrist flexion-extension 10 repetitions each) • 10 minutes of Lower limb exercises- ROM exercises (Ankle-toe movements, Inversion eversion, Knee flexion-extension, hip flexion- extension, hip abduction-adduction, Squats 10 repetitions each • 10 minutes of Core exercises- bridging, pelvic rotations, unilateral knee to chest, bilateral knee to chest, spinal extension on elbows, prone knee bending. • 05 minutes of Cool down- Relaxation and breathing exercises



Outcome measuring tool

Outcome measures that are used in this study to assess the balance and gait in geriatric population are TUG(time up and go) test, FRT (Functional reach test), and FGA (functional gait assessment)

TUG- it is a clinical tool that is widely used to assess functional balance and mobility, primarily in older adults. Traditionally, the test is scored by manually recording the time taken to rise out of a standardized chair, walk three meters, turn around, walk back, turn and sit back down in the chair.[12]

FRT-FRT represents the maximal distance a subject can reach forward beyond arm's length while maintaining a fixed base of support in the standing position. . In the modified lateral reach test, the subject is asked to reach as far as possible to the right and left sides. The measurement of lateral FR was expressed adding the measurements of reach to the right and left side (cm).[13]

FGA- Functional gait assessment used to assess postural stability, gait and balance during different tasks in populations. It is a 10 item based functional index that is used to access gait. It has 7-8 items from the DGI dynamic gait index and 3 new items that includes gait with narrow base of support gait backward and gait with eye closed. Each item is scored on 4-point scale ranging from 3 as normal, 2 as mild impairment 1 graded as moderate impairment and 0 is severe impairment (cannot perform without assistance, or sever gait imbalance)[14]

Patient Information Sheet

PATIENT INFORMATION SHEET FORM

Name:

Age/Gender:

Weight: BMI:

Height:

Heart Rate:

Blood Pressure:

Oxygen Saturation:

Exclusion Criteria:

Individuals shouldn't less than 60 years of age

Individuals shouldn't be suffering from:

1.Any musculoskeletal disorder i.e. Recent fractures, dislocation, spinal disorders

2. Neurological disorders i.e. Parkinson's, Alzheimer's, dementias

3. Cardiac disease i.e. Recent CHF (congestive heart failure), MI (myocardial infarction)

4. Recent Surgeries

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