COMPARATIVE STUDY ON THE EFFICACY OF FUNCTIONAL TASK EXERCISES AND RESISTANCE EXERCISE TO IMPROVE DAILY FUNCTIONS IN GERIATRIC POPULATIONS

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ABSTRACT

To evaluate the efficacy of functional tasks exercise program to improve functional performance of geriatric population by comparing it with a resistance exercise program. Thirty percent of all geriatric population over age 65 years fall at least once each year. This percentage is even higher for women and older adults with neurologic or musculoskeletal disorders. Among older adults, the consequences of falling include 31% to 48% having a fear of falling, 19% to 26% reducing activity levels and fall injuries occurring in 46% to 60% of all falls. Serious injuries have been found to occur in 6% to 14% of alls. Deaths from falls also occur for people over the age of 65 years, with 1 study finding 2.2 deaths occurring for every 100 fall-injury events admitted to acute medical facilities. Hence the need of this study is to find the efficacy of functional task exercise programme improving balance and mobility in geriatric population. Out of 119 of old men and women of age between 65 and 85 were selected from Valli Old Age Home, Kundrathur.

KEYWORDS: Modified 20 Point Barthel Index, TUG Test, Resisted Exercises, Functional Task Exercises, Geriatric Populations

INTRODUCTION

The purpose of geriatric physical therapy intervention is to improve (or) maintain the functional status of the individual. According to the theory of programmed aging (Lamber et al, 1997; wesiman 1891) Claiming that aging is only the final Chapter in the genetically governed developmental process of an organisms. Aging is strongly associated with impaired mobility and decreased physical functional performance. As a consequence, there is a loss of independence and quality of life, and the risk of falls and fractures increases. Approximately 20% of people between 65 and 75 years of age need assistance performing activities of daily living (ADLs), and this increases to 48 % in people older than 85. Climbing stairs, shopping, rising out of a chair or bed, house cleaning and washing and dressing oneself are the first ADLs to be affected. The decline in functional task performance is partly caused by the aging process and is accelerated by a sedentary lifestyle. Although aging is an irreversible process, the effects of decreased physical activity can be reversed in most people.

Many studies have shown that regular exercise is beneficial to basic physical function in older adults increasing muscle strength, balance, endurance and flexibility. However, the effects of exercise programs on the
performance of daily tasks have not been proven indisputable. This may be because most exercise intervention aim to enhance performance of functional tasks by improving just 1 basic physical function, mostly muscle strength, flexibility, or balance. The performance of functional tasks, however, is more complex and involves an interplay of cognitive, perceptual and motor functions and is closely linked to the individual’s dynamic environment. Training specificity implies that the performance of any given activity is maximized by training in that given activity. The Functional task exercise program, aiming at 40-minutes core exercise to improve daily task, namely moving with a vertical component, moving with a horizontal component, transporting an object and changing between the lying – sitting – standing position. Functional training includes the effects of real life object manipulation, which work on flexibility, core, balance, strength, and power, focusing on multiple movement phases.

Muscle strength decreases naturally as people age. This reduction in muscle strength could affect older adults carrying out daily activities. Progressive resistance training may improve muscle strength in older adults, Ching-ju Liu of the dept of occupational therapy at the Indiana university at Indiana polis in the US says that severe adverse events were rare and most reported events were muscle soreness and pain. Long-term effect was not assessed in most trials, did not know how long it could last. Senile atrophy – wasting of tissues and organs with advancing age from decreased catabolic (or) anabolic processes, at times due to endocrine changes, decreased use (or) ischaemia. This study primarily aims at prevention of falls in elderly by improving the balance and mobility and thereby improving the functional performance level.

**METHODOLOGY & MATERIALS:**
**STUDY DESIGN:** Experimental study, **STUDY SETTING:** Valli Old AgeHome, Kundrathur, Chennai69. **STUDY DURATION:** 12 weeks (3 months) **STUDY POPULATION** Out of 119 of old men and women of age between 65 and 85 were selected from Valli Old Age Home. **SAMPLE SIZE** N = 30 (15 each group) **SAMPLE TECHNIQUE** Simple random sampling technique.

**Selection Criteria Inclusion Criteria**
- Medically stable individuals of age group between 65 and 85, both Male and female gender included.
- May not take part in any other exercise training program during the training course of this study of 12 weeks.

**Exclusion Criteria**
- Recent fractures.
- Unstable cardio-vascular or metabolic disease.
- Severe airflow obstructions.
- Recent depression or emotional distress.
- Any reason for a loss of mobility for more than 1 week in the previous 2 months.
- Participant exercising at a sports club 3 times a week or more were also excluded.
- Any type of neurological problem (Parkinsonism).
- Patient with depression or mood disorders.
- Individuals using walking aids.
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Materials Used

- Chair with seat height of 50cm.
- Stop watch.
- Tray with small objects.
- Sand bags.
- Weighted buckets.
- Dumb bells.
- Elastic tubing.
- Inch tape.

**Figure 1**

Assessment Tools

- Modified 20 point Barthel index scores for functional status.
- TUG test (timed Up and go test) for balance and mobility.

**PROCEDURE**

The 119 subjects were selected based on the inclusion and exclusion from an old age home. 30 subjects were randomly selected from 119 subjects. They were divided into 2 groups with 3 objects were randomly assigned to 2 groups with each 15 subjects. N=15, Group –I Functional group, N=15, Group II resistance group. Modified 20 point Barthel Index scoring and TUG test (Timed up and go test) were used to evaluate the functional status and balance, mobility for all the 30 subjects and recorded as the pretest values. Both exercise programme were given for 3 times weeks in 1 hour session for 12 weeks with session separated by a day of rest. Sessions were divided into 10 minutes warm-up-period consists of aerobis exercises, 40 minutes period of care exercises and a 10 minutes of cool down period consists of flexibility exercises for limb & trunk.

**Group I: Functional Group**

All the 15 subjects were trained with functional task exercises to improve functional performance level. The 12 weeks program was divided into a practice phase (2 weeks) a variation phase (4 weeks) and a daily task phase (6 weeks). The core exercises were listed in appendix –I are followed according to the phases each exercises were repeated for 5 – 10 times.

**Group II: Resistance Group**

The 40 minutes core resistance exercise were designed according to the American college of sports medicine
position stand on exercise and physical activity for older adults. Exercise were aimed to strengthen, the muscle groups that are important for daily tasks, namely, The wrist flexors and extensors, Elbow flexors and extensors, Shoulder abductors and adductors, rotators, Trunk flexors, extensors, hip flexors, extensors, abductor and adductors, Knee flexors, extensors and ankle dorsiflexor and plantar flexors. 3 to 4 muscle groups were trained in 3 sets of 10 repetition in each exercise class. Dumbbells (0.5 – 8 kg) and elastic tubing were used for resistance during wrist, elbow, shoulder, ankle and trunk exercises. Ankle weights (0.25 -10.00kg) were used for resistance during hip and knee exercises. To strengthen the ankle plantar flexors, the body weight was used for resistance by raising the body up as high as possible on the toes. Participants alternated upper and lower body exercises to prevent overuse injuries with approximately 2 minutes of rest between sets. Modified 20 point Barthel Index scoring and TUG test (Timed up and go test) were used to evaluate the functional status and balance, mobility for all the 30 subjects and recorded as the posttest values.

Table 1: Comparison of Pre and Post Test of Modified 20 Point Barthel Index & Tug Test in Group I (Functional Group)

<table>
<thead>
<tr>
<th>Paired Samples Statistics</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Mean</td>
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<tr>
<td>Paired Modified 20 pt Barthel Index Scores –pre test</td>
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<tr>
<td>Paired Modified 20 pt Barthel Index Scores –post test</td>
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<tr>
<td>Paired TUG TEST -PRE TEST</td>
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<td>Paired TUG TEST -POST TEST</td>
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Paired Sample Test

<table>
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<tr>
<th>Paired Differences</th>
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<th>Std. Deviation</th>
<th>T</th>
<th>Significance</th>
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</thead>
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<tr>
<td>Paired Modified 20 pt Barthel Index Scores – pre test</td>
<td>4.600</td>
<td>1.183</td>
<td>15.057</td>
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<tr>
<td>Paired Modified 20 pt Barthel Index Scores – post test</td>
<td>5.000</td>
<td>1.309</td>
<td>14.790</td>
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</table>

Interpretation

Table 1 shows the significant differences of P value <.0005 level in their post test, when comparing the pre test of modified 20 Barthel Index score and Tug test values, the post test shows significant difference by training functional task exercises.

Table 2: Comparison of Pre and Post Test of Modified 20 Point Barthel Index & Tug Test in Group II (Resistance Group)

<table>
<thead>
<tr>
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<tr>
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<td>Paired Modified 20 pt Barthel Index Scores –pre test</td>
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<td>Paired TUG TEST -PRE TEST</td>
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Paired Sample Tests

<table>
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<tr>
<td></td>
<td>Mean</td>
<td>Std. Deviation</td>
<td>T</td>
<td>Significance</td>
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<td>Pair Modified 20 pt 1 Barthel Index Scores – pre test - Modified 20 pt Barthel Index Scores – post test</td>
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<td>Pair TUG test- pre test 2 TUG test- post test</td>
<td>2.267</td>
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</table>

Interpretation

Table 2 shows significant differences of P value <.0005 level in their post test, when comparing the pre test of Modified 20 point Barthel Index and Tug test values, the post test of both shows significant differences by training them with resistance exercise.

Table 3: Post Test Comparison of Modified 20 Point Barthel Index and Tug Test between Group I and II

<table>
<thead>
<tr>
<th>Scores</th>
<th>Functional Group I</th>
<th>Resistance Group II</th>
<th>Significance</th>
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</thead>
<tbody>
<tr>
<td>Modified 20 point Barthel index scores (Post test)</td>
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<td>Standard Deviation</td>
<td>T Value</td>
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<tr>
<td>4.600</td>
<td>1.183</td>
<td>15.057</td>
<td></td>
</tr>
<tr>
<td>TUG Test (Post Test)</td>
<td>5.600</td>
<td>1.309</td>
<td>14.790</td>
</tr>
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</table>

Interpretation

Table 3 shows Inter group comparison of improvement between group I and Group II in modified 20 point Barthel Index scores shows that Group I is demonstrating better improvement in Modified Barthel Index scores than Group II, which is statistically significant P value <.0005. Inter group comparison of improvement between group I and Group II in TUG Test scores shows that Group I is demonstrating better improvement in TUG Test scores than Group II, which is statistically significant P value <.0005
Graph 1: Graphical Representation

Graphical Representation

Photo 2: Functional Training

Graph 1 represents that comparison of functional and resistance group in Modified 20 point Barthel Index scores pre test and post test shows the pre test value same, differences in post test values.
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RESULTS

Table 1 shows the significant differences of P value <.0005 level in their post test, when comparing the pre test of modified 20 Barthel Index score and Tug test values, the post test shows significant difference by training functional task exercises. Table 2 shows significant differences of P value <.0005 level in their post test, when comparing the pre test of Modified 20 point Barthel Index and Tug test values, the post test of both shows significant differences by training them with resistance exercise. Table 3 shows Inter group comparison of improvement between group I and Group II in modified 20 point Barthel Index scores shows that Group I is demonstrating better improvement in Modified Barthel Index scores than Group II, which is statistically significant P value <.0005. Inter group comparison of improvement between group I and Group II in TUG Test scores shows that Group I is demonstrating better improvement in TUG Test scores than Group II, which is statistically significant P value <.0005. Graph 1 represents that comparison of functional and resistance group in Modified 20 point Barthel Index scores pre test and post test shows the pre test value same, differences in post test values. Graph 2 represents that comparison of functional and resistance group in TUG Test scores pre and post test shows significant difference in post test values. There was significant improvement in the functional group (post test) so that functional task exercise improve daily function than the resisted exercise.

DISCUSSIONS

The objective of the study was to evaluate the efficacy of functional task exercises comparing it with resisted
exercise in improving daily functions in geriatric population. **De Vreede**, Stated in his studies that functional task exercises program appears tolerable by over the age of 70 and above living in the community.**Bweir et al.,** in 2009 in his meta analysis of randomized controlled 9 trials evaluated 372 subjects with type 2 diabetes, has proven that resistance training has enhanced insulin sensitivity and improved glucose tolerance, as well as improve the strength and size of the skeletal muscles. Properly performed resistance training can provide significant functional benefits and improvement in overall health and well being. In 2009 **Spenne Wyn** conducted a research which compared functional training to fixed variable training technique. This was considered the first research of its type comparing the two methods of strength training. Results of the study showed very substantial gains and benefits in the functional training group over fixed resistance training equipment. Functional user had a 58% greater increases in strength over the fixed form group. Their improvement in balance were 196% higher over fixed and reported an overall increase in joint pain by 30%. **Blenner Hassett, J, & Dite, W (2004)** in his study on stroke patient has stated that task related practice improves mobility and upper limb functions early after stroke. Patient makes larger gains in functional task used in their rehabilitation. Since they are more likely to continue practicing the tasks in everyday living.

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The study has also revealed that the functional training group I has generated more scores in 20 point Barthel Index scores and TUG test values than group II. The mean difference of functional group trained for 12 weeks is found to be statistically significant than the mean difference of resistance group. Much more difference can be expected in a further long term study. The probable reason being the task specific training yields long lasting reorganization which is specific to the areas of brain being used with each task in accordance to Spenne Wyn.

More over functional task exercises which were found to be simple basic initially when varied in variation phase kept the trainees motivated & attained positively a high degree of acceptance by the trainees when compared to complex and widely used resisted exercise. This study shows that there is significant increase in functional status, balance and mobility in both the functional group and resistance group proven by 20 point Barthel Index scores & TUG test values after
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CONCLUSIONS

To evaluate the efficacy of functional tasks exercise program to improve functional performance of geriatric population by comparing it with a resistance exercise program. This study showed the functional group I showed a significant improvement in daily function activity than the resistance group II after 12 weeks of training. As a result, we conclude that functional training should have place in Geriatric rehabilitation in whom we except balance & mobility decline due to aging in restoring function.

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