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The Effect of Motor Dual: Task Balance Training on Balance and Gait of Elderly Women

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ABSTRACT

BACKGROUND: Aging in its broadest sense is the continuous and irreversible decline in the efficiency of various physiological processes. India has second largest number of elderly (60+) in the world. One of the most common problems of elderly is fall. They are the cause of accidental death among people over 65 years of age and account for significant mortality and morbidity, including fractures, impaired mobility and decreased quality of life due to fear of falling and death. Balance is dynamic phenomenon that requires stability and mobility to be a good harmony and in order to properly maintain body balance, the ability to integrate the neurological and musculoskeletal system is important. Balance control is a necessary component of stable walking. Dual-task training is defined as the ability to perform two or more cognitive and motor activities simultaneously while maintaining postural control.

AIMS AND OBJECTIVES: To study the effect of motor dual-task balance training on balance and gait of elderly women.

METHODOLOGY: Thirty females were randomly selected according to inclusion and exclusion criteria and was divided into two groups – Group 1: Experimental group and Group 2: Control group. Both the groups were assessed for the berg balance scale and dynamic gait index. These parameters were assessed before the start of the program as pre-test values and at the end of 6 week as post-test values. Group 1 received motor dual task balance training and Group 2 conventional balance and gait training.

RESULT: The mean age of group 1 was 67.4 years and group 2 was 67.07 years. The statistical analysis correlates the study by proposing that groups taken for study either group1 treated motor dual task balance training and Group 2 conventional balance and gait training.and also showed that group 1 treated with motor dual task balance training had higher significance when compared to group 2 treated with conventional balance and gait training. The mean improvement in BBS was 13.74 in group 1 and 10.66 in group 2. The mean improvement in DGI scores was 6.47 in group 1 and 3.73 in group 2. It was resulted that group 1 received motor dual task balance training had a superior effect over group 2 received conventional balance and gait training.

CONCLUSION: This study concluded that motor dual task balance training had effective tool in improving balance and gait control and decreases tendency of falls in elderly women.

KEYWORDS: Fall, Elderly, Balance, gait, BBS, DGI, motor dual task balance training, conventional balance and gait training.

INTRODUCTION

Aging in its broadest sense is the continuous and irreversible decline in the efficiency of various physiological processes.[1] India has second largest number of elderly (60+) in the world. The size of India's elderly population aged 60 and above is expected to increase from 77million in 2001 to 179 million in 2031 and further to 301 million in 2051. The proportion is likely to reach 12% in 2031 and 17% in 2051.[2]

A decline in all major systems for eg. Cardiovascular, metabolic, respiratory and neuromuscular contributes to weakness, fatigue and slowing of movements that has been the hallmark of aging.[3]

One of the most common problems of elderly is fall. They are the cause of accidental death among people over 65 years of age and account for significant mortality and morbidity, including fractures, impaired mobility and decreased quality of life due to fear of falling and death. Around 20% of falls among elderly results in serious injury and atleast 2 - 10% of fall results in fractures. Because mortality and morbidity associated with falls, they result in marked cost of heath care system and are major heath concern.[4]

Among community dwelling older people over 65 years of age 28 – 35% fall each year. Of those who are 70 years and older, approximately 32 – 42% fall each year and 40% of them experienced recurrent falls.[5]

Balance is dynamic phenomenon that requires stability and mobility to be a good harmony and in order to properly maintain body balance, the ability to integrate the neurological and musculoskeletal system is important.[6] All the stimuli coming from various sensory receptors such as visual, somatic, proprioceptive, skin, joint and vestibular receptors are integrated in different levels of CNS, affecting an individual's ability to maintain balance through efficient muscle tone, muscle strength, endurance and flexibility of joints.[7]

Balance control is a necessary component of stable walking. Many adults change their walking pattern as they aged and this is expressed as decreases in walking velocity, step length and adaptive responses that ensures safe gait. [8]

Elderly persons in comparison with younger persons demonstrate a decrease in natural walking speed, shorter stride and step lengths, longer duration of double-support periods and smaller ratios of swing to support phases. In general elderly persons select a free speed ie. Slower than the free speed gait of young people. Women had a greater stride length in proportional to their height and they walked with a greater cadence than males. Himann and associates found that between 19 and 62 years of age, there was a 2.5% to 4.5% decline in normal speed of walking per decade for men and women respectively. After 62 years of age, there was an accelerated decline in normal walking speed ie.16% and 12% decline in walking speed for men and women respectively.[9]

As individuals age, the step width and gait speed in the gait process decrease and the double support stance phase during the gait cycle lengthen. Such growth in double support stance phase increases the step width which is related to gait instability and is a factor of falls.[10] In addition, a reduction in gait speed in elderly people means that their ability to perform movement in ordinary life decreases. In order to enhance gait stability, lower limb muscle strength training and balance training are frequently used.[11]

In day –to-day living activities with simultaneous walking and talking task old age found difficulty in performing, they used to either stop walking or take a longer time to complete their gait task. Balance performing is influenced by simultaneously performing a cognitive task.[12] Dual task is common part of daily living activities that routinely elevates the risk of falling. Gait impairments are ubiquitous among the elderly population especially among patients with common neurological diseases.[13]

Balance control is a necessary component of stable walking. Many adults change their walking pattern as they age, and this is expressed as decreases in walking velocity, step length, and adaptive responses that ensure safe gait[14]

The importance of regular exercises in the prevention of injurious fall and frail health in elder adults is unclear. Exercises has beneficial physiological effects in older adults, including effects on strength, aerobic capacity, flexibility and bone strength. [15]

Dual-task training is defined as the ability to perform two or more cognitive and motor activities simultaneously while maintaining postural control. The dual-task methodology is the primary approach used to investigate interactions between cognitive processing and motor performance. Among elder adults, impairment in control of balance under dual task conditions is a common occurrence. Because impaired dual task balance performance predicts adverse effect outcomes such as fall and decline in both cognition and physical function.[16]

Simultaneous performance of secondary tasks had a deleterious effect on functional mobility. The effect of secondary task was dependent on the difficulty of postural task. Older adults with balance problems and a history of recurrent falls swayed more when performing either secondary task even in less challenging postural condition. The effect of secondary task in postural control was dependent upon balance abilities of subject, the difficulty of balance task and type of secondary task being performed.[17]

Dual task training includes such tasks like walking adjusting TV set via remote control, balancing on one leg while reading, walking while carrying a cup of water.[18]

A number of studies have examined the ability of older adults to concurrently perform motor function and task demanding cognitive attention. Most studies have shown decreases in walking ability related to changes in postural stability, gait velocity, cadence, and stride length.[19] **Bowen et al.** compared walking speed and balance of stroke patients between performance with and without a verbal cognitive task.[20] **Kizony et al.** introduced cognitive load and dual-task training during locomotion for stroke patients using a functional virtual environment. The ability to divide one's attention between two or more concurrent tasks is an important aspect of functional movement during ADL. The functional capacity of older people is stressed when performing several tasks simultaneously, due to their limited capacity to perform the tasks, either because they require greater attention resources, or due to limitations in their information processing capacity of older peoples.[21]

Silsupadol et al. emphasized the importance of balance training based on dual-task conditions. They suggested that intervening none of these studies investigated the effects of motor dual-task balance training on the balance and gait of elderly women. Therefore, the purpose of the present study is to investigate the effect of a motor dual-task balance program to improve balance and gait of elderly women for their well-being life.

OBJECTIVES OF THE STUDY

The main objectives of the study are-

1. To study the effect of motor dual-task balance training on balance and gait of elderly women.

2. To study the effect of conventional balance and gait training on balance and gait of elderly women.
3. To compare the effectiveness of motor dual-task balance training and conventional balance and gait training on balance and gait of elderly women.

HYPOTHESIS

EXPERIMENTAL HYPOTHESIS

It states that there is significant effect of the motor dual task training and conventional balance and gait training in improving balance and gait of elderly women.

NULL HYPOTHESIS

It states that there is no significant effect of the motor dual task training and conventional balance and gait training in improving balance and gait of elderly women.

REVIEW OF LITERATURE

1. **Sun - Shil – Shin, Duk – Hyn – An, 2014,** compared the effect of single task balance training (SBT) and motor dual task balance training (MDBT) conditions on balance and gait of elderly women who can walk independently without any Assistive device. The post intervention balance of MDBT group was significantly better than that of the SBT group. Walking ability also showed a significant improvement when compared to that of the SBT group. [23]
2. **Major MY, Fatone S, Roth AN, 2013,** did a study to evaluate the validity and reliability of balance berg scale and concluded that BUS appears to be valid and reliable instrument for assessing balance in individuals with lower limb amputation.[24]
3. **Adore EL, Rodriguez- Manas L et al, 2012,** concluded that multi component exercise intervention composed by strength, endurance and balance training seems to be the best strategy to improve rate of fall, gait ability, balance and strength performance in physically frail older adults. [25]
4. **Sumbala Buragadda et al, 2012,** conducted a four week study to evaluate the effect of fixed priority versus variable priority dual task training for improving balance in older adults. Outcome measured by Berg balance Scale and Activity specific Balance Confidence (ABC) Scale. The result showed that there was significant improvement in balance of older adult who received dual task training with variable priority instruction set. [26]
5. **Vanshika Sethi, Ravi Raja, 2012,** conducted a study on effects of dual task training on balance and ADL in patients with Parkinsonism.30 Parkinsonism patients of fifty and above are divided into two groups. They resulted that significant improvement in balance of both of groups after training session but more improvement under variable priority instructional set as compared to fixed priority instructional set. [27]
6. **Patima Silsupodal et al, 2009,** concluded that dual – task training is effective in improving gait speed under dual task conditions in elderly with balance impairment. Training balance under single – task conditions may not generalize to balance control during dual – task contexts. Explicit instructions regarding attentional focus is an important factors contributing to the rate of learning and the retention of dual – task training effect. [28]
7. **Tania Herman, Noit Inbar-Borovsky et al, 2009** evaluated the DGI and it's association with falls, dear of falling, depression, anxiety and other measures of balance and mobility in 278 healthy elderly individuals. The findings suggest that the DGI appears to be an appropriate tool for assessing function in healthy older individuals. [29]

8. **Stokes EK, 2009,** A change of 4 points is needed to be 95% confident that true change has occurred if a patient scores within 45-56 initially, 5 points if they score within 35-44, 7 points if they score within 25-34 and, finally, 5 points if their initial score is within 0-24 on the Berg Balance Scale. [30]
9. **Cattaneo D, Jonsdottir J et al, 2007,** did a study on 44 subjects with multiple sclerosis. In this group 1 received balance rehabilitation to improve motor and sensory strategies and group 2 received balance rehabilitation to improve motor strategy and group 3 received not specifically aimed to balance. They concluded that balance rehabilitation showed significant improvement in balance in multiple sclerosis. [31]
10. **Jeffrey M hausdorff et al. 2006**, have suggested that usual walking abilities and cognitive function contribute to the dual task effect on gait. Meeting the everyday challenges of walking while dual tasking apparently relies on multiple factors including a consistent gait pattern. [32]
11. **Faber MJ, Bosscher RJ et all, 2006,** did a 20 weeks, multicenter randomized controlled trail with 52 weeks follow-up to determine the effect of moderate intensity group exercise programs on falls, functional performance and disability in older adults and resulted that participants in both groups showed small but significant improvement in their Performance Oriented Mobility Assessment (POMA) and physical performance scores. In the Functional Walking (FW) group, this held true for Groningen Activity Restriction Scale (GARS) score as well. Post hoc analysis revealed that only pre-friar participants improved their POMA and physical performance score. [33]
12. **Barak Y, Wagenaar RC, Holt KG, 2006** resulted that fifty seven percent of the callers were unable to walk at a fastest speed, whereas all non-fallers walked comfortably at all walking speeds. Although the callers showed significantly greater STF, smaller stride length, smaller center of mass lateral away and smaller ankle planter flexion and hip extension during push-off, they showed increased variability of kinematic measures in their coordination of walking compared with the non-fallers. [34]
13. **Sihvonen S, Sipila S et. Al.,2004** did a study on 27 elderly women to examine the effect of 4 weeks individualized visual feedback based balance training on the fall incidence for 1 year fellow-up among frail older women living in residential care. They concluded that individualized visual feedback based balance training shown to be a promising method for fall prevention among frail older women. [35]
14. **Chang JT, Morton SC, Rubenstein LZ, Mozica WA, 2004**, did a study to assess the relative effectiveness of interventions to prevent falls in in older adults to either a usual care group or control group and concluded that interventions to prevent falls in older adults are effective in reducing both the risk of falling and the monthly rate of falling. The most effective intervention was a multifactorial fall risk assessment and management program. Exercise programmers were also effective in reducing the risk of falling. [36]
15. **Hiroyuki S, et al, 2003,** concluded that balance exercises led to improvements in static balance function and gait exercises resulted in improvements to dynamic balance and gait functions in the very frail elderly. [37]
16. **H. Shimada et al., 2003,** evaluate the specific effects of balance and gait exercises among frail elderly individuals. Thirty four individuals are included and randomly divided into two groups. Both groups received balance or gait exercises for 40 min, 2-3 times weekly for 12 weeks. Thy concluded that balance exercises led to improvements in static balance function and gait exercises resulted in improvements to dynamic balance and gait functions in very frail elderly. [38]

17. **TM Steffen et al., 2002,** conducted age and gender related test performance in community dwelling elderly people. Data were collected on the Six minute walk test, BBS and Time up and Go Test. They resulted that Six minute walk test, BBS and Time up and Go Test measurements showed high test retest reliability (ICC(2,1)=.95-.97. [39]
18. **Laurence Z. Rubensten et al, 2000,** conducting a study on 59 community living fall prone men and resulted that exercise showed significant improvement in measures of endurance and gait. Isokinetic endurance increased 21% for right knee flexion and 26% for extension. Exercise had a 10% increase score on an observational gait scale. Activity level increased within exercise group. These finding suggested that exercise can improve endurance, strength and gait and function in chronically impaired, fall prone elderly persons. .In addition, increased physical activity was associated with reduced fall rates when adjusted for level of activity. [40]
19. **David M. Buchner et al. 1997,** conducted the single blinded, randomized controlled trail to evaluate the effect of strength and endurance training on gait, balance, physical health status, fall risk and health services use in older adults. They resulted that there were no effects of exercises on gait, balance and physical health status. Exercise had a protective effect on risk of falling (relative hazard = .53, 95% CI = .30 - .91). They concluded that exercises may have beneficial effects on fall rates and health care use in some subgroup of older adults. [41]
20. **Anne Shumway Cook et al. 1997,** Examined the effect of multi-dimensional exercise program on balance, mobility and risk of fall in community dwelling older adults. They included 105 community-dwelling older adults above the age of 65 years. They resulted that both exercises programs scored better on all measures than the control group who received no intervention. [42]
21. **R Topp et al, 1993,** conducted a study to test whether a 12 week dynamic resistance strength training can change gait velocity and improve measures of balance among older adults age 65 and older. 55 community dwelling adults mean age 71.1 years were randomized into an exercise (n=25) or control (n=30) group. The exercises were requested to complete 3 bouts of strength training per week for 12 weeks using elastic tubing. At post test the exercisers demonstrated slower gait velocity, enhanced balance and an improved ability to walk backwards, although none of these post test measures was significantly different from the control group.[43]
22. **Berg KO, Maki BE et al, 1992,** did a cross sectional study to compare scores on the balance scale with laboratory measures of postural sway and other clinical measures of balance and mobility. They resulted that balance scale was most efficient measures to discriminate between subjects according to their use of each type of mobility aids. Data supports the validity of balance scale in geriatric population. [44]

METHODOLOGY

STUDY DESIGN: Comparative study design.

SOURCE OF DATA: Healthy elderly women of Bangalore

SAMPLE SIZE: 30 women.

DURATION OF THE STUDY: 6 Weeks.

SAMPLE SELECTION:

30 women were randomly selected according to inclusion and exclusion criteria and divided into two groups –

Group 1: experimental group and Group 2: control group.

All individuals will be participates in the study voluntarily after signing consent form.

Inclusion criteria:

1. Age group: 60 - 80years.
2. Healthy elderly women.
3. Able to understand verbal commands
4. Able to walk without any assistive devices.

Exclusion criteria:

1. Neurological problems which affects balance and walking
2. Musculoskeletal problems which affects balance and walking
3. Cardio-vascular Instability
4. Hearing and vision impairments
5. Psychiatric patients

MATERIALS USED

1. Examination table
2. Pillow
3. Shoebox
4. Cones
5. Stairs
6. Chair
7. Stool
8. Berg balance Scale
9. Dynamic Gait Index
10. Pen
11. Paper

INTERVENTION:

Thirty women were randomly selected according to inclusion and exclusion criteria and divided into two groups – Group 1: experimental group and Group 2: control group. Group 1were received Dual task training and Group 2 were received Conventional Balance and Gait training for 6 weeks. Outcome measures were measured by Berg Balance Scale and Dynamic Gait Index.

Group 1:

1. Balance exercises on physio ball while talking :

Position: Sitting on Physio ball.

Procedure: Patient sitting on Physio ball. Ask the patient to move towards right and left side while talking.

Repetitions: 20 times in a session.

2. Standing Reach outs while talking :

Position: Standing.

Procedure: In standing ask the patient to move towards right and left side and touch the given objects while talking.
Repetitions: 20 times in a session.

3. Semi tandem walking while counting 1 to 200 :

Position: Standing on a line.
Procedure: Patient standing on a line. Ask the patient to walk on a line by placing the foot on sides of line while counting 1 to 200.
Repetitions: 100 steps in a session.

4. Tandem walking while counting 200 to1:

Position: Standing on a line.
Procedure: Patient standing on a line. Ask the patient to walk on a line by crossing the foot while counting 200 to 1.
Repetitions: 100 steps in a session.

5. Obstacle crossing with low to high volume talking:

Position: Standing in front of obstacles.
Procedure: Standing in front of obstacles. Ask the patient to cross the objects with low to high volume talking.
Repetitions: 100 steps in a session.

PARAMETERS:

Training Session Duration: 45 Minutes.
Frequency: 5 times a week for 6 weeks.

Group 2:

1. Static Balance training :

Position: Standing.
Procedure: Ask the patient to maintain the balance in standing position.
Repetitions: 10 repetitions in a session.

2. Dynamic balance training :

Position: Standing.
Procedure: Ask the patient to alternately move the lower limb forwards, backward and outwards on both sides.
Repetitions: 10 times each movements in a session.

3. Unsupported gait training :

Position: Standing.
Procedure: Ask the patient to walk independently in plain surface
Repetitions: 200 meters in a session.

PARAMETERS:

Training Session Duration: 45 Minutes.
Frequency: 5 times a week for 6 weeks.

OUTCOME MEASURES:

- **Berg balance Scale**

- **Dynamic Gait Index**

Description:

Developed to assess the likelihood of falling in older adults. Designed to test eight facets of gait.
Equipment needed: Box (Shoebox), Cones (2), Stairs, 20inch walkway, 15inch wide
Completion:
Time: 15 minutes
Scoring: A four-point ordinal scale, ranging from 0-3. "0" indicates the lowest level of
Function and "3" the highest level of function.
Total Score = 24
Interpretation: < 19/24 = predictive of falls in the elderly
> 22/24 = safe ambulatory

DATA ANALYSIS

Pre-test and Post-test data within the group and between groups will be analyzed by using Paired and unpaired' test. The differences between pre - test and post – test values were found. It was done for the values taken before and at the end of sixth week respectively. The mean difference of Berg Balance Scale and Dynamic Gait Scale of group I were compared with group II and the actual pattern of variation were observed. With the 't' value from the pre-test and post-test, the accurate level of significance was analyzed and interpreted. An alpha level of $p<0.05$ was the level of significance for the test. Paired't' test was performed to analyze the efficacy of treatment within the groups and unpaired 't' test was performed to analyze the efficacy of treatment between both groups.

RESULT AND DATA INTERPRETATION:

Thirty elderly females of age group between 60 – 80 years were randomly selected according to inclusion and exclusion criteria and divided into two groups with 15 females in each group. Group 1 had a mean age of 67.4 years

Group 2 had a mean age of 67.07 years.

TABLE 1: DEMOGRAPHIC PRESENTATION OF DATA IN GROUP 1 AND 2:

GROUP	NUMBER	AGE IN YEARS	
		MEAN	SD
Group 1	15	67.4	4.4849
Group 2	15	67.07	4.1827

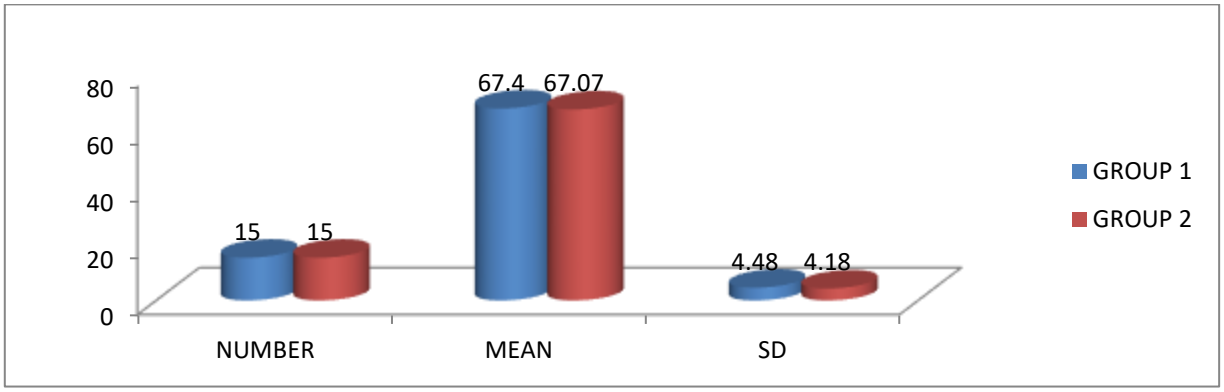


TABLE 2: ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF BERG BALANCE SCALE (BBS) FOR SIGNIFICANCE WITHIN GROUP1:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance level
Pre-test BBS	32.33	15	2.96808	0.773254	13.74	13.7029	0.00001	P<0.05
Post-test	46.07	15	5.16121	1.379392				

INTERPRETATION:

The above table shows the pre-test and post-test 't' value 13.7029 of Berg Balance Scale (BBS) within group 1 analysis. When compared to table value, the above 't' value is greater at p<0.05, which is significant. It indicates that group 1 had improvement within themselves with the respective treatment used.

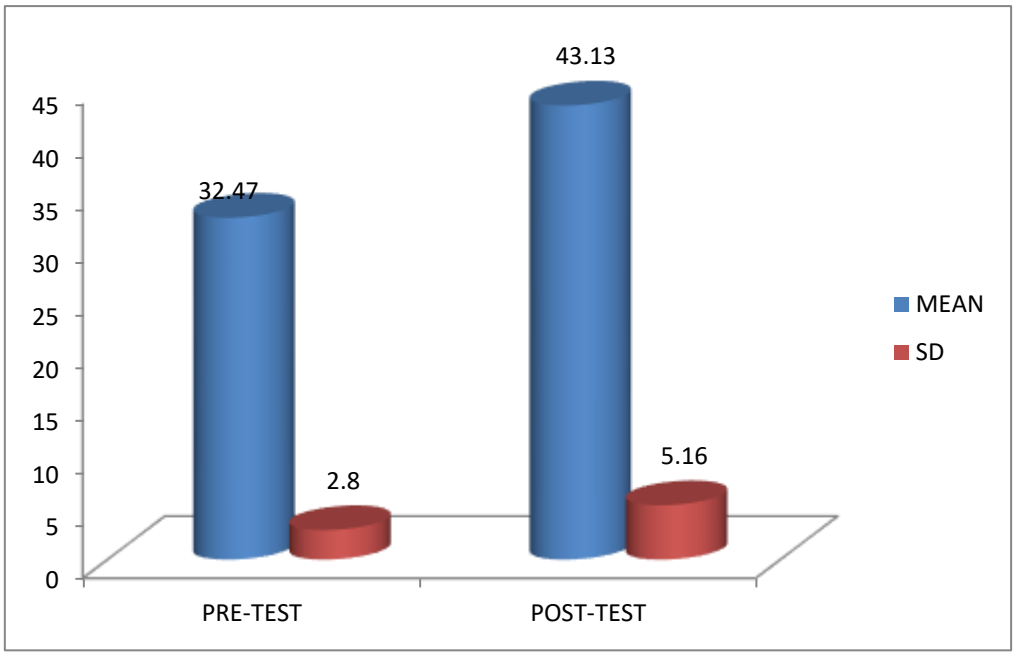


TABLE 3: ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF BERG BALANCE SCALE (BBS) FOR SIGNIFICANCE WITHIN GROUP2:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance level
Pre-test BBS Post-test	32.47	15	2.79966	0.728241	10.66	13.6963	0.0001	P<0.05

	43.13	15	4.050867	1.052121				

INTERPRETATION:

The above table shows the pre-test and post-test 't' value 13.6963 of Berg Balance Scale (BBS) within group 2 analysis. When compared to table value, the above 't' value is greater at p<0.05, which is significant.

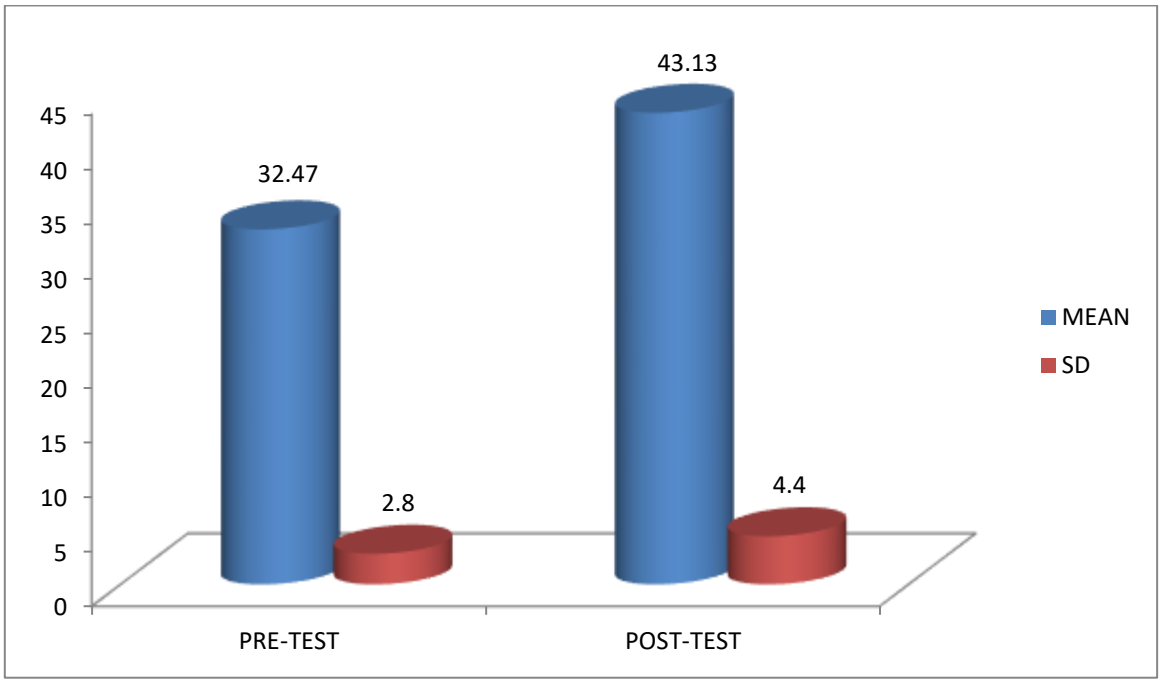


TABLE 4 : ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF DYNAMIC GAIT INDEX (DGI) FOR SIGNIFICANCE WITHIN GROUP1:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance Level
Pre-test DGI	13.8	15	1.65616	0.432627	5.47	11.7143	0.00001	P<0.05
Post-test	19.27	15	2.25093	0.581232				

INTERPRETATION:

The above table shows the pre-test and post-test 't' value 11.7143 of Dynamic Gait Index (DGI) scores within group 1 analysis. When compared to table value, the above 't' value is greater at p<0.05, which is significant.

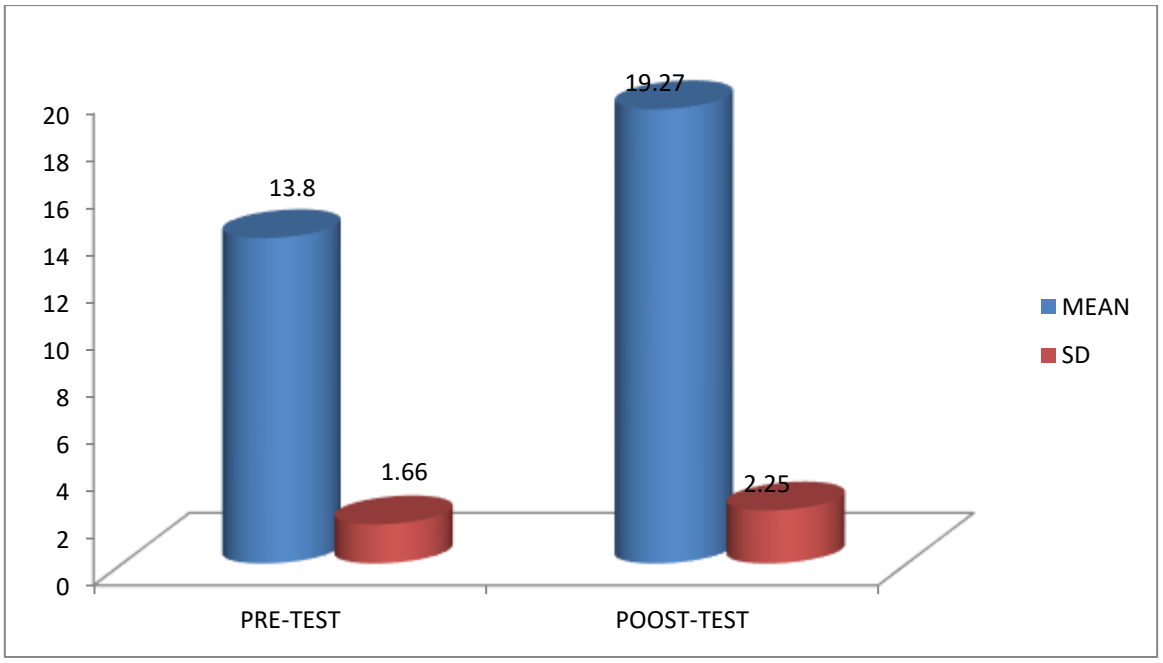


TABLE 5: ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF DYNAMIC GAIT INDEX (DGI) SCORES FOR SIGNIFICANCE WITHIN GROUP 2:

	Mean	N	SD	Std. Error Mean	Mean Diff	T	P	Significance level
Pre-test	13.6	15	1.454058	0.38861				
DGI					3.73	9.1535	0.00001	P<0.05
Post-test	17.33	15	2.225395	0.57476				

INTERPRETATION:

The above table shows the pre-test and post-test 't' value 9.1535 of Dynamic Gait Index within group 2 analysis. When compared to table value, the above 't' value is greater at p<0.05, which is significant.

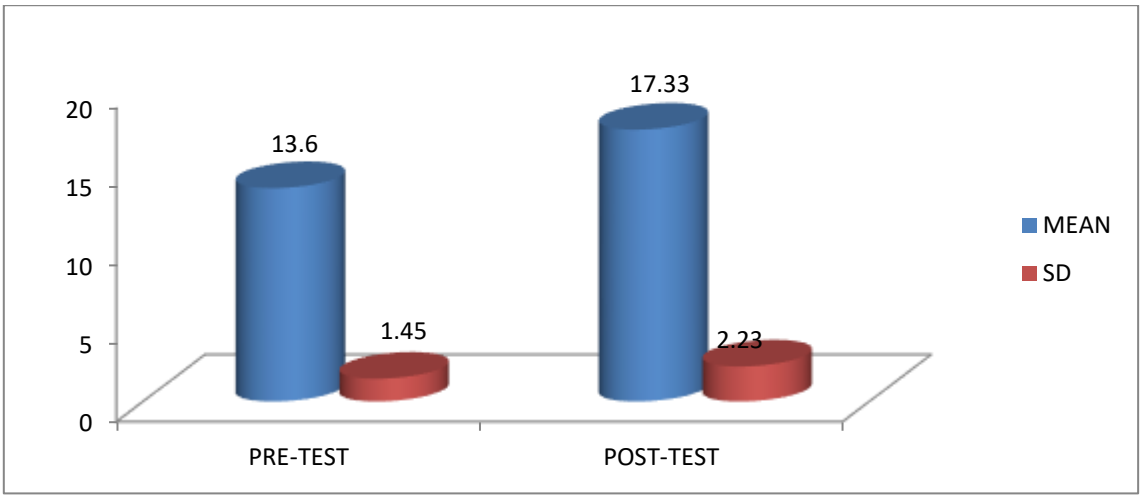


TABLE 6 : ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF BERG BALANCE SCALE SCORES FOR SIGNIFICANCE BETWEEN GROUPS:

	Group	Mean	N	SD	Std. Error Mean	Mean Diff	t	p	Significance level
BBS PRE-TEST	1	32.33	15	2.96808	0.773254	0.14	0.1328	0.8953	P<0.05
	2	32.47	15	2.79966	0.728241				
	Group	**Mean**	**N**	**SD**	**Std. Error Mean**	**Mean Diff**	***t***	***p***	**Significance level**
BBS POST-TEST	1	46.07	15	5.161211	1.37939	2.94	1.7359	0.0336	P<0.05
	2	43.13	15	4.050867	1.052121				

INTERPRETATION:

The above table shows the pre-test value of 't' 0.1328 for balance berg scores between groups. When compared to table value, the above 't' value is lesser at p<0.05, which is not significant and proving the homogeneity of both the groups.

The above table shows the post-test value of 't' 1.7359 for Berg Balance scores between groups. When compared to table value, the above 't' value is greater at p<0.05, which is significant.

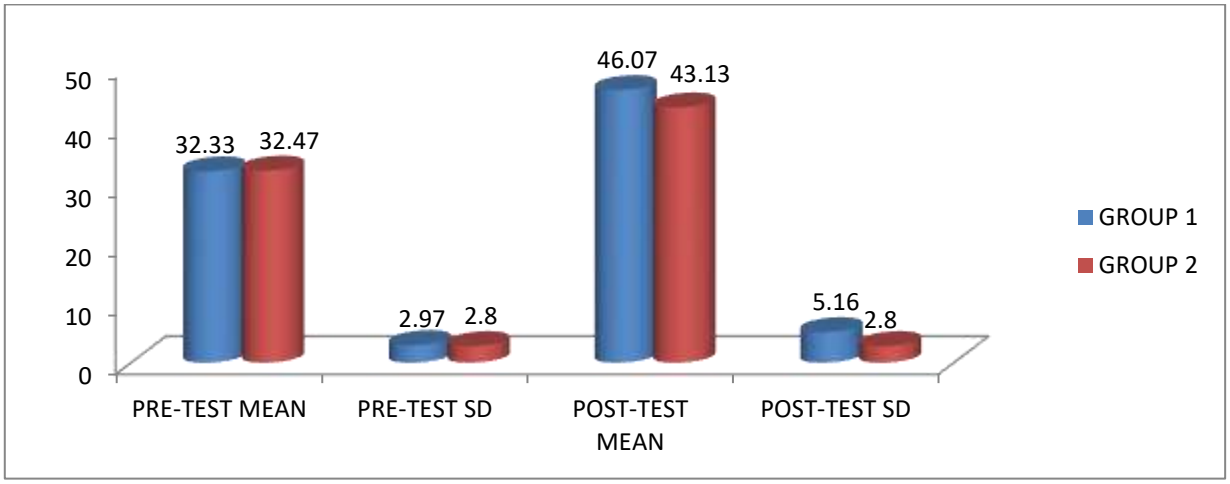


TABLE 7 : ANALYSIS OF PRE-TEST AND POST-TEST VALUES OF DYNAMIC GAIT INDEX SCORES FOR SIGNIFICANCE BETWEEN GROUPS:

	Group	Mean	N	SD	Std. Error Mean	Mean Diff	t	p	Significance level
DGI PRE-TEST	1	13.8	15	1.75616	0.432627	0.2	0.3514	0.07279	P<0.05
	2	13.6	15	1.45406	0.388613				

	Group	Mean	N	SD	Std. Error Mean	Mean Diff	t	p	Significance level
DGI POST-TEST	1	19.27	15	2.250926	0.581232	1.94	2.3718	0.0072	P<0.05
	2	17.33	15	2.225395	0.574762				

INTERPRETATION:

The above table shows the pre-test value of 't' 0.3514 for Dynamic Gait Index scores between groups. When compared to table value, the 't' value is greater at p<0.05, which is significant.

The above table shows the post-test value of 't' 2.3718for Dynamic Gait Index scores between groups. When compared to table value, the 't' value is greater at p<0.05, which is significant.

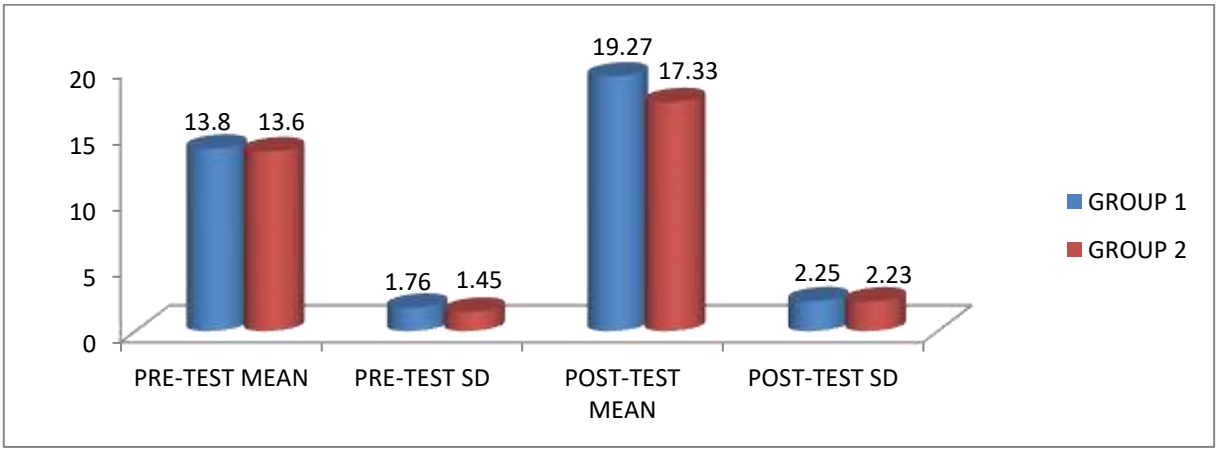


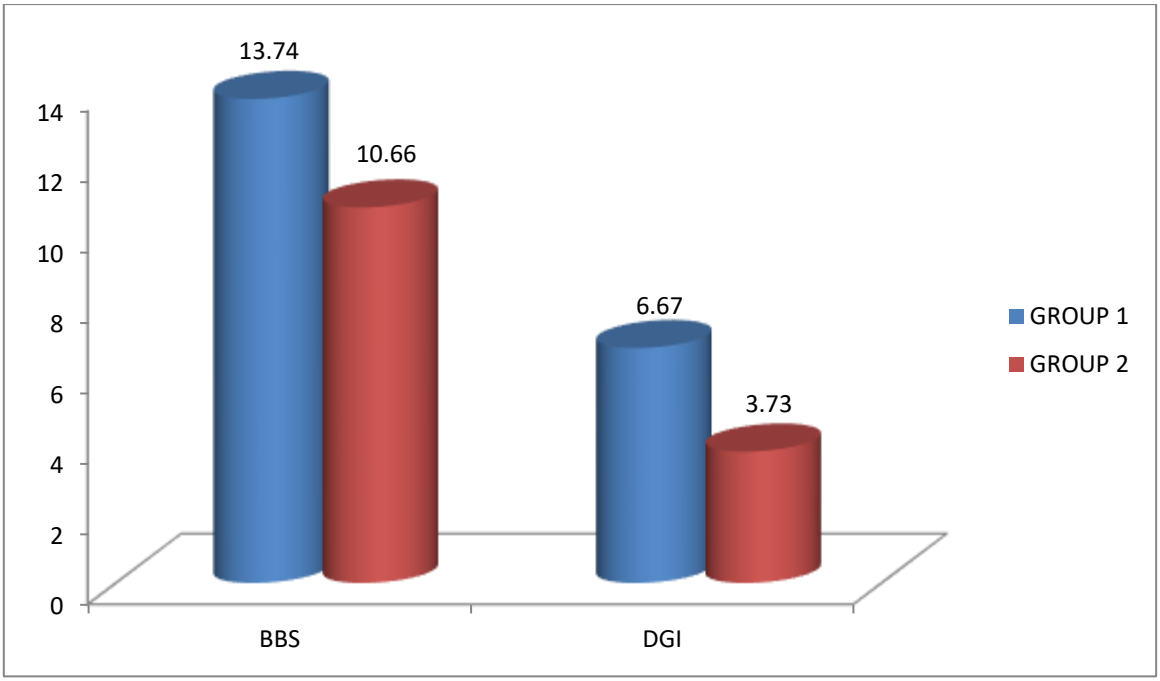
TABLE 8 : MEAN IMPROVEMENT IN ALL THE PARAMETERS BETWEEN GROUP 1 AND GROUP 2:

PARAMETERS	GROUP 1	GROUP 2
BBS	13.74	10.66
DGI	6.47	3.73

INTERPRETATION:

The above table shows the mean improvement in Berg Balance Scores was 13.74 in group 1 and 10.66 in group 2. It was resulted that group 1 had a superior effect over group 2 treatment.

The above table shows the mean improvement in Dynamic Gait Index scores was 6.47 in group 1 and 3.73 in group 2. It was resulted that group 1 had a superior effect over group 2 treatment.



DISCUSSION

This study was done to analyse the effect of Motor Dual task balance training on balance and gait in elderly women. Elderly peoples are prone to fall. In day –to-day living activities with simultaneous walking and talking task old age found difficulty in performing, they used to either stop walking or take a longer time to complete their gait task.

In this study, total 30 elderly women age between 60 to 80 were selected randomly and divided into two groups- group 1 and group 2 (15 patients in each group), who received motor dual task balance training and conventional balance and gait training respectively. The improvement in balance and gait were assessed by using Berg balance scale and Dynamic gait index. Pre-test data were collected at the beginning of the study and post-test data were collected at the end of 6th week. The data were statistically analyzed and comparing group 1 and group 2, both the group showed significant improvement in balance and gait, but group 1 not only showed greater improvement but also recorded a

high degree of consistency with 't' values and as seen in graph showing mean improvement of both the parameters (figure 8), there is greater improvement in mean of Balance berg scale and dynamic gait index in group 1.

The chief objective of this study was to evaluate the effect of Motor Dual task balance training on balance and gait of elderly women.. The statistical analysis correlates the study by proposing that groups taken for study either group1 treated by motor dual-task balance training or group 2 treated by conventional balance and gait training showed significant effect in improvement of balance and gait and also showed that group 1 treated with motor dual task balance training had higher significance when compared to group 2 treated with conventional balance and gait training. Based on data, the experimental hypothesis is accepted.

The result of this study were significant at $p<0.05$ and is strongly supports the earlier findings of **Shun-Shil Shin, Duk-Hyun An (2014)**which states that motor dual task balance training improves balance and walking ability more than simple balance training. [51]

LIMITATIONS AND RECOMMENDATIONS OF THE STUDY

- The study was limited to elderly women only.
- The study was limited due to less number of patients.
- The study was limited age group between 60 – 80 years.
- The study was limited on only motor dual task balance training.

RECOMMENDATIONS FOR FURTHER STUDY

1. It may be recommended that study could be done on more than 30 elderly women.
2. It may be recommended that more studies are needed to be done in various techniques to improve balance and gait in elderly women.
3. In this study only two techniques are used, further studies can be possible by using more than two techniques to find out most effective treatment for balance and gait in elderly men and women.
4. Further study may be done to observe the effect of motor dual task balance training with kinematic and kinetic data and muscle activation based on motor strategies.

CONCLUSION

This study can be concluded by stating that both motor dual task balance training and conventional balance and gait training have got beneficial effect on improving balance and gait in elderly women.

When both training regimens were taken into consideration for significance of mean difference the result of study states that motor dual task balance training have got more beneficial effect on improving balance and gait in elderly women.

SUMMARY

The present study aimed to determine the effect of motor dual task balance training where balance was assessed by Berg Balance Scale and gait was assessed by Dynamic Gait Index. In this study total thirty elderly women were selected and assigned randomly into two groups; Group I and Group II (Fifteen subjects in each) who received a motor dual task balance training and conventional balance and gait training respectively, for a period of 6 weeks and data were collected at the beginning of training (Pre-test) and at the end of training (Post-test).

Data were analyzed using Paired and Unpaired 't' test which showed that both motor dual task balance training and conventional balance and gait training have got beneficial effect on improving balance and gait of elderly women but when compared mean difference between two procedures for effectiveness, the result were significant for motor dual task balance training. Thus this study accepts the experimental hypothesis. Hence, motor dual task balance training is more effective than conventional balance and gait training on improving balance and gait in elderly women.

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MASTER CHART

1. Master chart of group 1:

S. NO.	SEX	AGE	BBS		DGI	
			PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
1	F	67	30	46	14	20
2	F	62	28	38	12	16
3	F	66	35	52	16	21
4	F	69	33	48	15	20
5	F	70	31	48	13	20

6	F	60	38	56	16	24
7	F	61	36	52	16	20
8	F	73	29	45	12	19
9	F	63	32	50	14	22
10	F	67	30	42	12	18
11	F	75	30	40	12	16
12	F	70	36	42	16	18
13	F	66	34	48	14	20
14	F	70	33	40	13	16
15	F	72	30	44	12	19

2. Master chart of group 2:

S. NO.	SEX	AGE	BBS		DGI	
			PRE-TEST	POST-TEST	PRE-TEST	POST-TEST
1	F	62	32	44	14	20
2	F	69	30	40	12	16
3	F	68	34	40	15	18
4	F	72	28	42	12	14
5	F	60	35	48	15	20
6	F	68	32	47	13	18
7	F	64	34	44	14	16
8	F	76	28	36	12	14
9	F	64	36	44	16	18
10	F	70	32	38	14	16
11	F	68	32	42	14	18
12	F	62	38	52	16	22
13	F	66	32	46	12	18
14	F	68	34	42	13	16
15	F	69	30	42	12	16