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The Influence Of Group Exercise On Improving Balance And Reducing Fall Risks Among Patients With Multiple Sclerosis - A Comparative Study."

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Abstract

Title: "The influence of group exercise on improving balance and reducing fall risks among Multiple Sclerosis Patients: A Comparative Analysis."

Background: MS, or multiple sclerosis is a chronic neurological condition that often reduces equilibrium and raises the possibility of falls, significantly affecting patients' mobility and quality of life. Exercise therapy is a key intervention in MS rehabilitation, yet the comparative impact of group versus individual exercise remains underexplored.

Objective: This study aims to evaluate the efficiency of group exercise to increase equilibrium and lower the hazard of falls in multiple sclerosis of individuals with, compared to individual exercise and no intervention.

Methodology: A total of 45 participants diagnosed with MS were casually assigned into three groups: A of Group (group exercise), Group B (individual exercise), and Group C (control). Sessions were held 3 times a week for eight weeks through the intervention. Balance and fall risk were assessed pre- and post-intervention using the The Fall Efficacy Scale International (FES-I), the Berg Balance Scale (BBS), and the Timed Up and Go (TUG) test.

Results: Participants in Group A showed significant improvement in BBS and TUG scores and reported a reduced fear of falling compared to B and C cohorts ($p < 0.05$). Group B. Also demonstrated improvement, though less pronounced than Group

A. The control group showed no significant changes.

Conclusion: Group exercise is additional effective than individual exercise or no intervention in enlightening equilibrium and reducing fall risks among MS patients. These findings suggest that incorporating group-based physical activity into MS rehabilitation programs may enhance functional outcomes and promote social engagement.

Keywords: Fall risk, balance, multiple sclerosis, group exercise, rehabilitation, and comparative analysis

Introduction

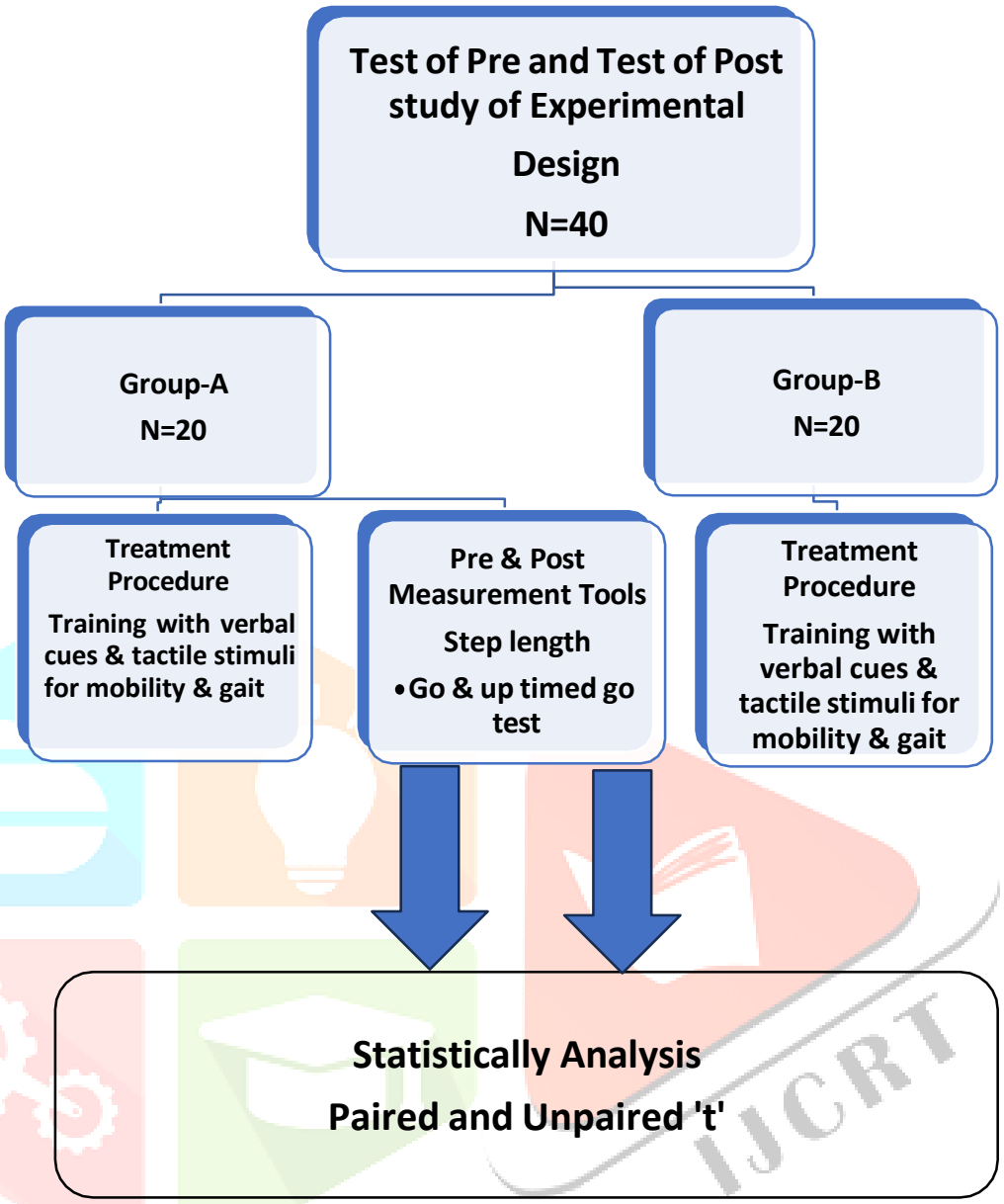
Individuals with multiple sclerosis frequently experience impaired trunk control and balance, as well as trouble doing dual tasks. Certain exercises can improve balance functions, which may help reduce falls. The insulating sheaths of nerve cells in the brain and spinal cord are harmed by multiple sclerosis (MS), a demyelinating illness. Among the numerous indicators are physical, emotional, and even mental health problems. and symptoms that arise from this damage, which interferes with the communication between various nervous system components. Coordination problems, sensory abnormalities, muscle weakness, double vision, or one-eye blindness are examples of specific signs. Multiple sclerosis can present itself in a number of ways, with new symptoms appearing either gradually (progressive forms) or suddenly (relapsing forms).

Here are various types of multiple sclerosis, and new symptoms can either develop gradually over might manifest in sporadic episodes either gradually (progressive forms) or relapsingly. Between outbreaks, symptoms could go away entirely, but long-term neurological issues frequently persist, particularly as the illness worsens. Certain exercises can enhance balance function, which may help prevent falls. In one study, balance and mobility skills were programmed by an eight-week core stability exercise, according to Freeman et al.

In a different study, which involved 100 MS patients, core stability exercises were contrasted with regular activity and relaxation sessions. The program had no effect on walking ability or perceived confidence in balance., according to the study.

The demyelinating disease known as multiple sclerosis (MS) weakens the protective coverings of nerve cells in the brain and spinal cord. There are numerous indications and symptoms, including mental, emotional, and physical problems. That arise from this damage, which interferes with the communication between various nervous system components.

Methodology Flow Chart:



Methodology

This study utilized a quantitative, comparative experimental design to systematically investigate the effects of a group exercise intervention on balance and fall risk in patients diagnosed with multiple sclerosis (MS). The research was conducted at Kailashi SuperSpeciality & Ajay Super Speciality Hospital, Meerut. The core of this approach was to compare outcomes between an intervention group receiving a specialized program and a control group receiving standard physiotherapy, using standardized outcome measures collected before and after the intervention.

The study population included patients diagnosed with MS who were experiencing balance impairments or had a history of falls. A total of 30 participants were recruited for the study using a convenient sampling technique. To be included, participants had to be diagnosed with MS, aged between 18 and 60 years, medically stable, and cleared for physical activity. Key exclusion criteria included the presence of severe cognitive impairments, other neurological or musculoskeletal conditions affecting balance, a recent MS relapse, or unstable medical conditions that would contraindicate exercise.

The entire study was conducted over a nine-month period, which encompassed participant recruitment, pre-assessment, the intervention phase, and the final post-assessment. The independent variable was the type of therapeutic intervention, while the dependent variables were balance improvement and fall risk reduction. These variables were measured using a battery of standardized tools: the **Berg Balance Scale (BBS)** to evaluate balance performance, the **Timed Up and Go (TUG) test** to assess mobility and fall risk, and the **Fall Efficacy Scale-International (FES-I)** to gauge the fear of falling. Additionally, participants maintained a **Fall Diary/Log** to record the frequency of falls during the study period. Materials used for these assessments included a measuring device, two standard chairs (one with and one without armrests), a footrest, a 15-foot walkway, a stopwatch, tape, and recording sheets.

After recruitment, all 30 participants provided written informed consent and were then allocated into two equal groups: Group A (n=15) and Group B (n=15). Before the intervention, all subjects underwent a pre-test evaluation using the selected outcome measures, and their vital signs were checked. All participants received general instructions, such as wearing comfortable clothing, avoiding heavy meals before sessions, and immediately reporting any pain, dizziness, or discomfort. Regular attendance and adherence to safety guidelines were emphasized.

The intervention phase lasted for seven weeks, with both groups attending 60-minute sessions twice per week. **Group A (n=15)** received the **CoDuSo group exercise program**. These sessions consisted of 30 minutes of core stability exercises (e.g., pelvic bridging, prone on elbows, single-leg bridging) followed by 30 minutes of dual-tasking and sensory techniques. Dual-task training involved activities like walking on an uneven surface while carrying an object, while sensory activities included walking on varied surfaces (sand, pebbles) or modeling with clay. The therapist progressively increased the difficulty and provided a customized home exercise program.

Group B (n=15), the control group, received 60 minutes of **conventional physiotherapy**. This standard program included strengthening exercises, stretching exercises, gait training, balance and coordination exercises, and obstacle preparation, with a primary focus on physical workouts. The therapeutic equipment used across both interventions included exercise mats, a couch, a wobble board, Thera bands and tubes, peg boards, cones, and various obstacles.

The dual task training is shown in Fig. 3.1.

Core strengthening is demonstrated in Figure 3.2.

Results and Discussion

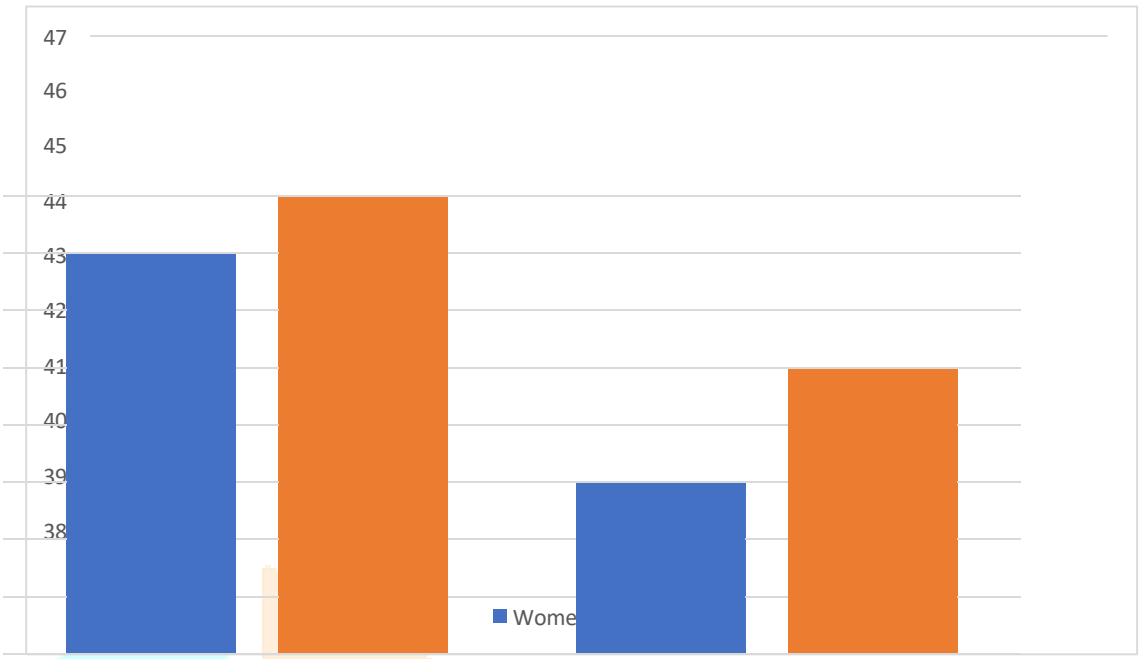
Table 4.1

Ages of groups A and B on average

Age of Group in Average	A Group	B Group
Women	45	41
Men	46	43

The age group information for the study's patients is displayed in Table 4.1 and Graph 4.2.

A & B groups age of mean average is shown in Graph 4.1.

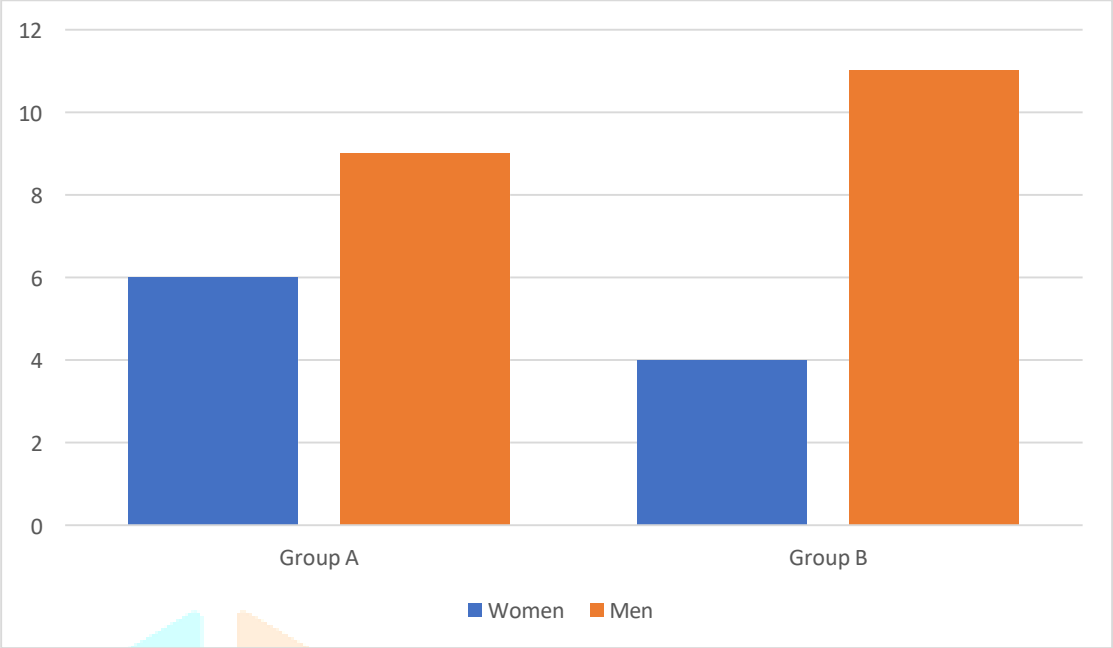


A & B groups Sex Distribution

The distribution of sexes in the study is displayed in Table 4.2 and Figure 4.2. In both groups, there are 40% females and 60% males.

Distribution of sexes	Group A	Group B
Women	6	4
Men	9	11

Group A and Group B's sex distribution is shown in Graph 4.2.



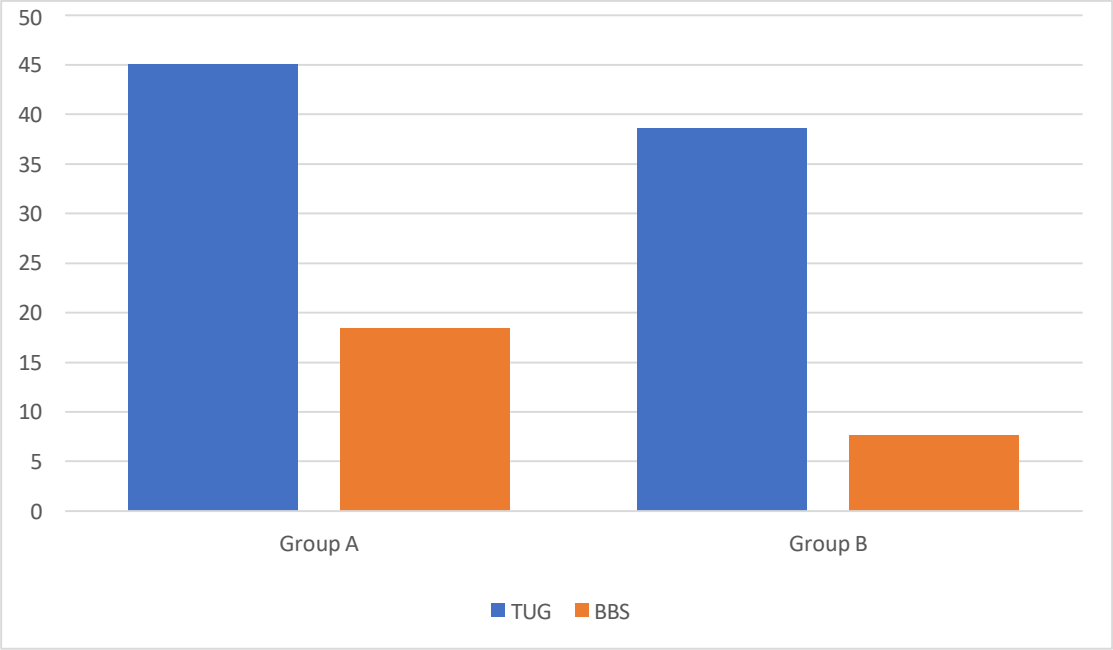
A & B groups OF TUG & BBS: MEAN DIFFERENCE

Table 4.3 displays the difference of mean between TUG & BBS Groups A and B.

The Groups	The Differences of Mean	
	TUG	BBS
Group A:	45	18.4
Group B:	38.6	7.6

The average BBS difference between Groups A and B is 18.4 and 7.6, respectively. For Groups A and B, there are 45 and 38.6 mean TUG differences, respectively.

The mean difference between BBS and TUG scales is shown in graph 4.3.



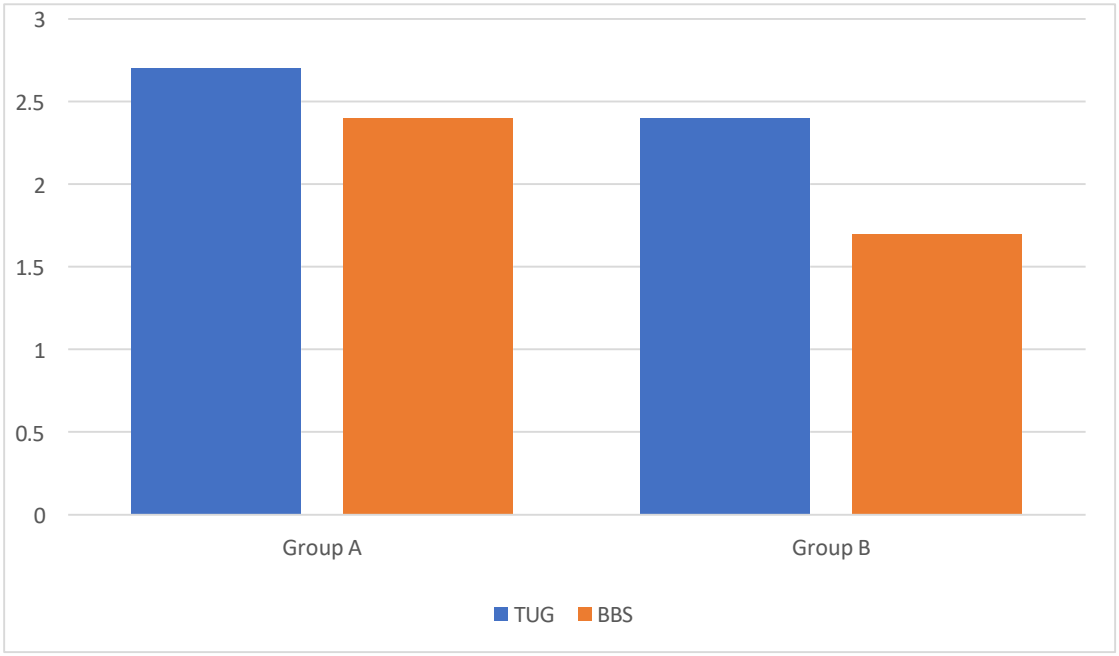
A & B groups of TUG and BBS scales standard deviation

The deviation of standard between groups A and B of TUG and BBS sales is displayed in Table 4.4.

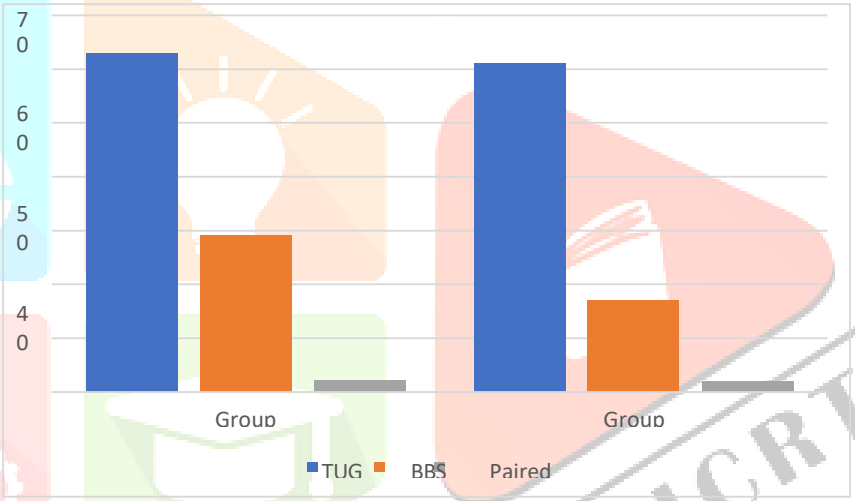
The Groups	The deviation of standard	
	TUG	BBS
A Group:	2.7	2.4
B Group:	2.4	1.7

2.7 and 2.4 are the standard deviation values for Group A, respectively.

2.4 and 1.7 are the standard deviation values for Group B, respectively.



Graph 4.4 shows the typical deviation of the TUG and BBS sizes.



DIFFERENCE BETWEEN THE TABLE VALUE AND THE TEST OF PAIRED "t"

Groups A and B

4.5 TABLE

The Groups	Values t		Values of Table	Values of Significant
	TUG	BBS		
A Group	63	29.13	2.15	**Significant**
B Group	61	16.9	2.15	**Significant**

At the 9 degrees of freedom and a 5% significance level, Group A's computed t values are 29.13 and 63, whereas group B's are 16.9 and 61. The table value is 2.15. This disproves the null hypothesis because The table t-value was lower than the computed t- value.

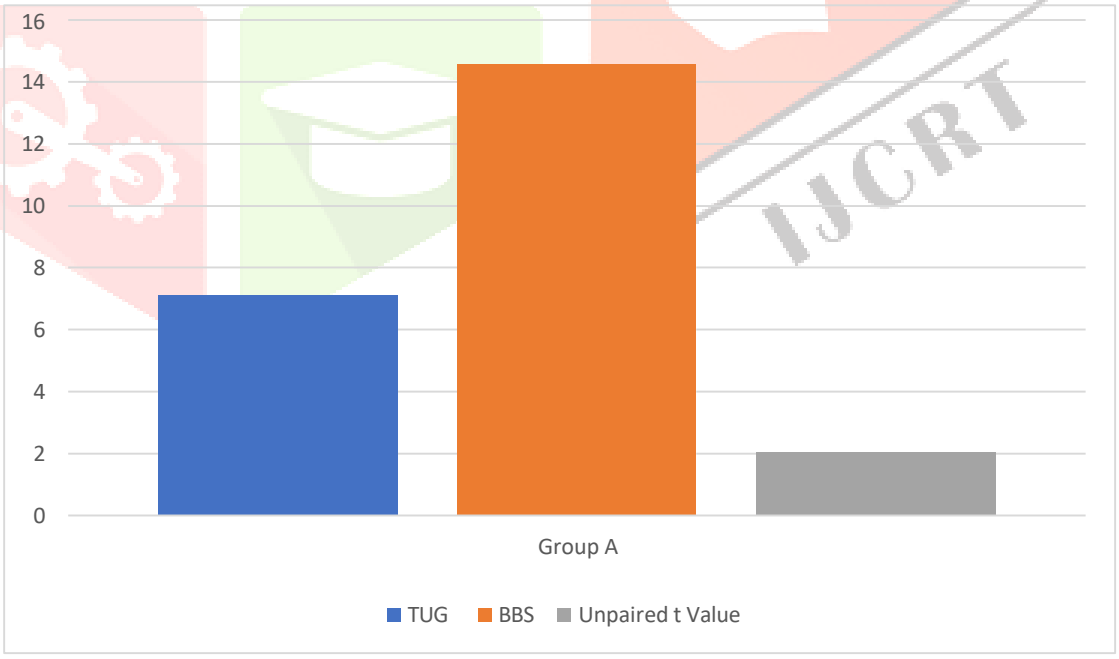
The TUG and BBS table values and the "t" test sales are shown in graph 4.5.

The Unpaired Comparison of "t" Test and Table Values.

TUG AND BBS TABLE 4.6:

The Groups	Values t of Unpaired		Values of Table	Values of Significant
	TUG	BBS		
Group A and Group B	7.1	14.59	2.05	Significant

The null hypothesis is rejected because the computed the value of table t was lower than the unpaired t value. which is 2.05 for 9 degrees of freedom and 14.59 for the determined the TUG unpaired t value at the 5% level of significance to be 7.1 and the BBS unpair t value to be 7.1.



The table of value TUG and BBS and the unpublished "t" test are shown in Graph -4.6.

Results:

Thirty patients with multiple sclerosis disease made up the study sample; ten were female and twenty were male. Fifteen of the thirty patients received C, while the remaining fifteen had traditional therapy. Group

A's before and post test results were evaluated using the short mental state evaluation scale and the Berg balancing scale. BBS's While TUG's is 45, 18 is the mean difference value. The paired t-test values for TUG and BBS are 63 and 29.13, respectively. BBS's standard deviation is 2.4, while The TUG is 2.7. The paired value of the t-test is greater than the table value at 14 degrees of freedom. of 2.15, or the 5% level of significance.

BBS and TUG evaluated group B's pre- and post-test results. BBS 7.6 and TUG had mean difference values of 38.6 and 38.6, respectively. TUG's standard deviation is 2.4, while BBS's is 1.7. For BBS is 16.9 for the t-test and 61 for TUG. At 14 degrees of freedom, the paired t-test value is greater than the table value of 2.15, or the 5% level of significance.

For A & B groups, the unpaired t test yielded a computed t value of 14.59 for BBS and 7.1 for TUG. For 28 degrees of freedom, and the calculated t value exceeded the 2.05 table value at the 5% level of significance.

Discussion

There were thirty patients of both sexes in the study sample. The patients' average age was fifty years old. At baseline, the groups' sexes, ages, and MS subtypes varied. In comparison to traditional physiotherapy treatments, according to the BBS and TUG scales as well as the felt walking limitation brought on by MS, according to this study, balance is improved by the CoDuSe balance group exercise program. Additionally, it reduces the quantity of falls and nearby falls. These conversations support those found in earlier research and show that the CoDuSe intervention is a potentially effective therapy. option for illness stages where there is a notable loss of walking capacity.

This outcome is consistent with that which was documented following twelve 30-minute workouts over the course of twelve weeks of pilates group research exercise, supplemented by a customized daily at-home exercise regimen.

Falls can cause injuries and limit one's activities, thus it's significant that the CoDuSe intervention reduced falls. The fact that these results can be replicated in a different population lends credence to the intervention's capacity to lower fall risk, at least temporarily. There were fewer speculative reports of near-falls as well. An effective tactic could be the ability to control unbalance without collapsing. It was also taught to the participants how to stay stable when they lost their equilibrium.

The CoDuSe group exercise program has been shown in this study to enhance balance and reduce the chance that people with multiple sclerosis will fall.

Summary and Conclusion

Among the most significant neuromuscular diseases is multiple sclerosis. This disease affects almost two-thirds of the population. numerous sclerosis patients frequently experience impaired trunk control and balance, as well as trouble juggling numerous tasks. Many people are at danger for falls because of their unbalance and unstable trunks. Because falls can cause injuries and limit activities, it is significant that the CoDuSe intervention reduced falls. Replicating these outcomes in a different sample demonstrates that the

intervention is successful in lowering fall risk, at least temporarily.

One of the most prevalent neuromuscular conditions is multiple sclerosis. Multiple sclerosis affects around one-third of the population. Based on the findings, NULL

Alternative hypotheses are accepted whereas hypotheses are rejected, and the study also found a significant difference.

Patients with multiple sclerosis can benefit from the Coduse group exercise program alongside traditional physiotherapy exercises to boost your balance and lower your chances of falling.

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