

EFFECT OF CONVENTIONAL PHYSIOTHERAPY VS MOTOR IMAGERY ALONG WITH CONVENTIONAL PHYSIOTHERAPY ON REACTIVE AND ANTICIPATORY BALANCE IN COMMUNITY DWELLING ELDERLY INDIVIDUALS: AN EXPERIMENTAL STUDY.

Physiotherapy

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ABSTRACT

Balance impairment, highly prevalent in the older age group is one of the most contributing factors, leading to falls. Anticipatory and Reactive balance are required for ADLs to prevent falls. The aim of this study was to compare the effects of motor imagery vs conventional PT for reactive and anticipatory balance in elderly population.

Methodology: 34 elderly patients meeting inclusion and exclusion criteria were selected and randomly divided into Group A received conventional PT along with Motor imagery and group B received conventional PT along with relaxation for 3 times a week for four weeks. MiniBESTest and Berg Balance scores were recorded before and after the treatment.

Results: Conventional PT along with Motor imagery was significantly better than conventional balance training alone in improving anticipatory and reactive balance in elderly individuals.

Conclusion: Motor imagery as an adjunct to conventional balance training is more effective than conventional balance training alone in improving anticipatory and reactive balance.

KEYWORDS

Balance, Elderly, Motor Imagery

INTRODUCTION

Older adulthood is accompanied by lower levels of physical fitness, which can impair functional performance as assessed by activities of daily living.⁽¹⁾ As numerous clinical trials have proven, exercise programs for elderly should focus on three major domains- Balance, strength and functional training.

Anticipatory and Reactive balance comes into action when the postural mechanisms work to prevent falls.⁽²⁾ Previous studies state that aging causes a reduction in the anticipatory and reactive balance in elderly. Motor imagery is an effective tool in improving the balance ability in the elderly and can assist the routine balance training programs.⁽³⁾ There occurs a dearth of literature on whether one protocol is better than the other to improve balance. The following study aims at introducing the additional effects of motor imagery on specifically the anticipatory and reactive balance of elderly population and hence compare the effects of conventional therapy and motor imagery.

Methodology:

This study was conducted in 34 community dwelling elderly individuals between 60-75 years of age were selected according to inclusion and exclusion criteria.

INCLUSION CRITERIA:

- Asymptomatic individuals between 60-75 years of age, free from cognitive deficits (MMSE>24).
- Individuals scoring (>21) on Berg balance scale.
- Individuals scoring less than 140 on Betts questionnaire will only be included in the study.
- Individuals with corrected refractory error.

EXCLUSION CRITERIA:

- Previous neuro-musculoskeletal problems which could interfere with the performance of balance exercises or hamper the study and those with uncontrolled diabetes and hypertension.
- Individuals participating in any other exercise program for balance and those performing yoga.

Procedure:

Ethical clearance from the ethical committee of the institute was obtained and participants were screened with Minimental scale and Betts questionnaire were taken. Screening of participants according to inclusion and exclusion criteria was done and Demographic data was recorded and Pre-treatment assessment in the form of MiniBESTest and Berg Balance was done and participants were divided into two groups by the Cluster randomized distribution.

Group A (Experimental): This group was given the conventional PT

for 30 mins followed by motor imagery audio for 10 mins. The motor imagery intervention for this group consisted of a prerecorded set of instructions played after conventional protocol on a speaker.

Group B (Conventional): This group was given conventional PT which consisted of exercises given in the balance training protocol for 30 mins and followed by imagery audio of relaxation exercises for 10 mins. These exercises were performed 3 times a week for 4 weeks period.

During the times of Covid-19 pandemic, special precautions laid down as per the central and state governments were strictly followed.



Figure 1: Subjects performing conventional physiotherapy exercises.



Figure 2: Subjects listening to Imagery audio post-exercises.

RESULTS AND STATISTICS

Descriptive statistics were performed for all the baseline characteristics of the participants.

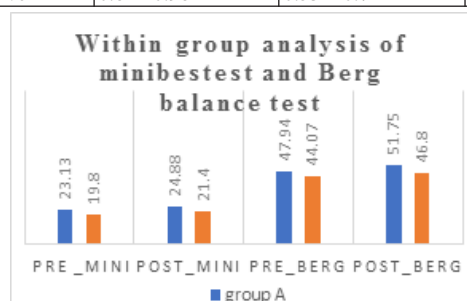
Data was analysed using SPSS software 18.0. Level of significance was set at 0.05 and Level of error was set at 10% and all data was calculated as per 95% confidence interval. MiniBESTest data and Berg balance test data was checked for normality in both groups and was found to be normally distributed.

Paired t-test was used to analyse the significance of pre-post difference within the groups whereas, unpaired t-test was used to analyse the significance of difference between the groups.

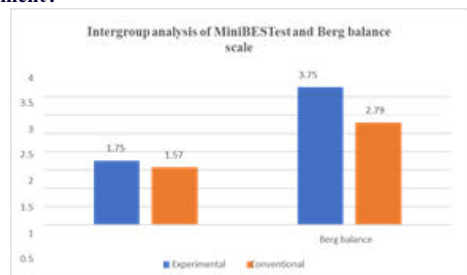
As data passed the test for normalcy, paired t-test was applied for within group analysis.

Table 1-Intergroup analysis of Group A and B

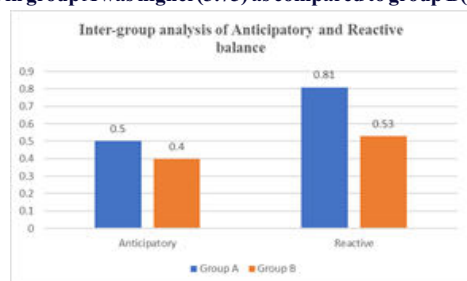
	Group A Mean $\pm$ SD	Group B Mean $\pm$ SD	p value
MiniBESTest	1.75 $\pm$ 1.18	1.57 $\pm$ 1.28	0.694
Berg Balance Scale	3.75 $\pm$ 1.29	2.79 $\pm$ 0.97	0.030
Anticipatory	0.50 $\pm$ 0.63	0.40 $\pm$ 0.51	0.63
Reactive	0.81 $\pm$ 0.98	0.53 $\pm$ 0.74	0.381



Graph 1: Mean of MiniBESTest and Berg balance test scores in Group A and Group B showed increase in post-treatment assessment.



Graph 2: Mean of MiniBESTest scores in group A was higher(1.75) as compared to group B(1.57) whereas Mean of Berg balance test scores in group A was higher(3.75) as compared to group B(2.79).



Graph 3:Inter-group analysis of anticipatory balance showed minimal increase (0.50) whereas reactive balance showed moderate increase (0.81).

DISCUSSION:

The purpose of this study was to determine the effectiveness of motor imagery on anticipatory and reactive balance in elderly. After eliminating the dropouts, data for 31 participants was recorded, tabulated and descriptive statistics for Age distribution, Gender were performed. Out of the 34 participants included in the study, 16 belonged to 60-65 yrs. age group, 6 belonged to 66-70 yrs. age group and 9 belonged to 71-75 yrs age group.

Paired t test was applied for within group pre-post analysis where mean

of MiniBESTest and Berg Balance test scores in both the groups was showed p value 0.000 which was statistically significant.

Melanie Lesinski et.al in her meta-analysis of 23 articles, concluded that balance training is effective in improving measures of static/dynamic steady state, proactive, and reactive balance as well as performance in balance test batteries in healthy old age.(4)

This can be attributable to increase in post scores of both conventional and the experimental group. The conventional protocol which was given to both the groups included exercises targeting the static and dynamic balance and progressed to increased repetitions after 2 weeks. Between group Analysis for Berg balance test scores was performed using unpaired t-test. The mean of difference of pre-post scores for Group A was 3.75($\pm$ 1.29) and that for Group B was 2.79($\pm$ 0.97), comparison of means showed a p value of 0.0303 which concluded that motor imagery along with conventional therapy was significant in improving anticipatory and reactive balance on berg balance scale.

This can be attributed to the beneficial effects of motor imagery and its role in enhancing motor control. The physiological mechanisms underlying the process of motor imagery have significant similarities with the mechanisms of motor control, and this can be used for the rehabilitation and training.(5)

Imaginary movements have been shown to be linked to conscious activation of areas of the brain which are also involved in the preparation and execution of the movement.(6)Many studies of healthy subjects have shown that imaginary movements produce activation of those brain structures which are activated on performing voluntary movements.

Furthermore, imaginary movements of different parts of the body (legs, arms, tongue) are accompanied by activation of the cerebral cortex, this being somatotopic in nature, which has been confirmed by results from studies using functional magnetic resonance tomography (fMRI).(7)

According to this, our study included imagination of functional tasks like sit to stand, stair climbing, obstacle walking and controlling balance after perturbation which must have led to activation of cerebral cortex.

According to Abbruzzese et al., modulation of corticospinal tract occurs as results of significant levels of suppression of inhibitory processes at the cortical level.(8) Thus, the experimental group performed better than the conventional group which was seen on the inter-group analysis of berg balance scale(p=0.03) this can be attributed to the additional effects of motor imagery when compared with the conventional group.

Between group Analysis for MiniBESTest scores was performed using unpaired t -test. The mean of difference of pre-post scores for experimental group was 1.75($\pm$ 3.67) and that for conventional group was 1.57($\pm$ 2.85), comparison of means showed a p value of 0.6948 which concluded that motor imagery in conjunction with conventional therapy was not significant in improving balance on MiniBESTest.

Referring to the age distribution majority of participants belonged to the age group between 60-65 years i.e., the young old population hence, they also showed a good score on MiniBESTest in the pre-assessment. Post-intervention the MiniBESTest score showed and improvement individually but as compared with the conventional didnot show significant improvement to be visible and make difference on MiniBESTest.

Along with this, further assessment of Anticipatory and Reactive component was done. Pre-post analysis for Anticipatory balance component was performed using paired t-test. For the experimental group, p value 0.000. The experimental group showed a greater difference in mean as compared to the conventional thus indicating the additional effect of motor imagery along with the conventional balance protocol on anticipatory and reactive balance.

Between group Analysis for Anticipatory component ,comparison of means resulted in p value of >0.000 which concluded that experimental group did not show statistically significant improvements over conventional group for improving anticipatory balance.

Comparisons of mean of differences in Reactive component resulted in p value was >0.000 which showed that experimental group did not show statistically significant improvements over conventional group for improving reactive balance.

These results conclude that greater improvement in the reactive component than the anticipatory visible on intragroup analysis of experimental group ($p=0.000$) in the physical therapy with additional MI group, who were guided with vivid motor imagery (group A), than in the patients of the muscle relaxation (group B).

Our results showed that the balance training with additional MI produced a significant improvement, which was greater than balance training alone in enhancing the balance and gait abilities of the elderly individuals which was evident on berg balance test scores. However, there was no significant difference in the MiniBESTest scores of these individuals.

CONCLUSIONS:

This study concluded that balance training with additional MI has a better effect than conventional balance training alone for improving balance in elderly individuals.

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