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Effectiveness of Yoga along with Occupational Therapy Intervention on Balance and Gait in Older Adults

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ABSTRACT

Background: Falls are a leading cause of morbidity among the elderly, with fear of falling (FoF) contributing to reduced physical activity, social participation, and quality of life. Evidence suggests that structured physical activity, including occupational therapy and yoga, may enhance balance and gait performance. However, limited research exists on their combined impact.

Methodology: A randomized controlled trial was conducted among 56 community-dwelling older adults aged 60–80 years with balance impairments or FoF. Participants were randomly assigned to either a control group receiving occupational therapy (OT) intervention or an experimental group receiving OT combined with yoga. Both groups underwent 12 weeks of bi-weekly sessions. Balance and gait were assessed using the Performance Oriented Mobility Assessment II (POMA II) at baseline and post-intervention. Statistical analysis was conducted using paired and independent t-tests with a significance level of $p<0.005$.

Results: Both groups demonstrated significant improvements in POMA II scores post-intervention. The experimental group showed greater improvements across multiple components including chair balance ($p=0.001$), standing balance ($p=0.000$), and gait elements such as walk initiation and step characteristics ($p<0.05$). Though both interventions were beneficial, the addition of yoga in the experimental group yielded superior outcomes in several domains, suggesting a synergistic effect.

Conclusion: Occupational therapy interventions, both alone and in combination with yoga, effectively improved balance and gait in older adults, contributing to a reduced risk of falls. The integration of yoga further enhanced these benefits, highlighting its potential as a valuable adjunct to traditional OT programs.

Keywords: occupational therapy, elderly, yoga, balance, fall prevention

INTRODUCTION

According to Population Census of 2011 there are nearly 104 million elderly persons (aged 60 years or above) in India and it is projected to be around 12.17% by 2026. Study reported presence of any form of disability in elderly population to be 5.1%. Out of these disability rates in movement and

seeing were highest (1309 per 1,00,000) and contributed for approximately 25% of all disabilities[1].

One of the main causes of morbidity and death among the elderly is falls[2]. Fear of Falls (FoF) is prevalent in the elderly population. Prevalence percentages range from 21 percent to 85 percent, depending on the demographic and measure. FoF has negative effects on independence and independent living, including impaired physical functioning, decreased social involvement, higher risk of falls, and activity avoidance. Various forms of therapies, including cognitive behavioral therapy (CBT), active video games, and tai chi, have previously shown decreases in elderly people's FoF [3–9].

Research suggests that exercise and other forms of physical activity can improve quality of life[10], decrease the prevalence of fear of falling and subsequently of falling by improving or maintaining balance, increasing bone mineral density, increasing muscle strength, and improving or maintaining functional activities. The World health organization's Physical activity (PA) recommendations for older adults include aerobic activities and muscle strengthening[11]. In addition, exercise and functional activities have been shown to improve balance, strength, and functional tasks, as well as reducing functional decline[12].

Occupational therapy for falls included resistance band exercises for strength and balance activities. Interventions can be given in a group and are therapeutic, improve cohesiveness of similar individuals, in still hope and allow for interpersonal learning to occur. Previous studies have demonstrated a relationship between yoga, falls and balance[13,14], however none have focused on the occupational therapy intervention as an adjunct with yoga as the variable of primary interest.

Therefore, the aim of this study is to explore the effectiveness of occupational therapy intervention as an adjunct with yoga on balance and gait among older adults to improve strength, flexibility, cognition, coordination and balance in older adults to decrease the risk of falls.

MATERIALS & METHODS

STUDY DESIGN: Randomized controlled trial (RCT)

STUDY POPULATION: Older adults in community

SAMPLE SIZE: 56 Participants

SAMPLING TECHNIQUE: Simple Random Sampling

STUDY DURATION: Three months

STUDY SETTING: Community center and home-based intervention

INCLUSION CRITERIA

- Participants within the age group of 60-80 year
- Participants having pre-diagnosed difficulty in balance or self-declared fear of falls

EXCLUSION CRITERIA

- Participants with organic neurological conditions like CVA, Parkinson's which affects their ability to maintain balance
- Active musculoskeletal affectations affecting physical abilities of movements and weight bearing
- Cardiac conditions restricting patients to participate in intervention

OUTCOME MEASURE

Performance Oriented Mobility Assessment II (POMA II)-

Also known as the Tinetti Balance and Gait Scale. This standardized assessment was developed by Tinetti et al. in 1986. POMA is one of the earliest and most widely used batteries designed to assess balance, gait, and fall risk in older adults. It includes an evaluation of balance under perturbed conditions such as while rising from a chair, after a nudge, with eyes closed, and while turning as well as an evaluation of gait characteristics (including gait initiation, step height, length, continuity and symmetry, trunk sway, and path deviation). A score less than 19 out of 28 has a sensitivity of 68%

and a specificity of 88% for predicting an individual who will have two or more falls

PROCEDURE

Post IEC approval and patient consent, participants were included in the study and randomly allocated in experimental and control groups. All participants received a comprehensive explanation of the proposed study, its benefits, inherent risks and expected time commitment of those involved. Baseline data was obtained using POMA scale. Participants completed a 12-week intervention program of two classes per week in which control group consisting of 30 minutes session and 45 minutes session for experimental group. These groups are further subdivided into three groups like A, B and C for both the groups. Group A consist of nine participants, Group B consist of nine participants, Group C consist of 10 participants. Group sessions were designed for experimental and control groups for providing respective interventions. Common techniques of intervention were given for all participants, while additional yoga-based intervention was delivered to experimental group. Details about interventions are provided in table no. 1. The intervention program was followed up through the period of 12 weeks. Post-intervention data was collected after 12 weeks of the OT intervention program using POMA to measure the outcomes.

TABLE 1: PHASE 1 ACTIVITIES FOR CONTROL GROUP PARTICIPANTS

ACTIVITIES	PURPOSE
Warm-up – Walking	
Ball catching and throwing	
Bouncing on therapy ball	Stimulating the muscles of the core -- the deep pelvic, abdominal, and low back muscles
Spinal rotation with ball	To improve spinal mobility, spinal flexibility, core strength
Weight shifting on therapy ball	To improve balance and stability
Elbow flexion with theraband	For strengthening of elbow flexors
Shoulder abduction with theraband	For strengthening of shoulder abductors
Shoulder flexion with theraband	For strengthening of shoulder flexors
Overhead elbow extension	For strengthening of elbow extensors

TABLE 2: PHASE 2 AND 3 ACTIVITIES FOR CONTROL GROUP PARTICIPANTS

ACTIVITIES	PURPOSE
Warm up- Walking	
Upper body strengthening exercises same as included in phase one	
Ball kicking in seated position with both legs at a time	For strengthening of lower extremity muscles
Ball kicking in seated position alternatively	For strengthening of lower extremity muscles
Ball kicking in standing position alternatively	For strengthening of lower extremity muscles
Side kicking on ball while standing	To strengthen lower body muscle groups
Supported toe standing	To strengthen core, hips, knees, ankles and toes.
Supported heel standing	To improve strength, balance weight-bearing tolerance.
Abovementioned activities with upgradation based on individual patient	

TABLE 3: PHASE 1 ACTIVITIES FOR EXPERIMENTAL GROUP PARTICIPANTS

ACTIVITIES	PURPOSE
Intervention same as included in control group phase 1	
Paschimottanasana [head to knee]	To stretch the spine, shoulders and hamstrings. Also, calms mind
SetuBhandasana [Bridge]	To strengthen back, buttocks and hamstrings
Bidalasana [Camel-Cat pose]	To improve the flexibility of spine.

TABLE 4: PHASE 2 ACTIVITIES FOR EXPERIMENTAL GROUP PARTICIPANTS

ACTIVITIES	PURPOSE
Intervention same as included in control group phase 2	
Dandasana [Staff]	To strengthen back muscles and to improve posture
Adho MukhaSwastikasana [Down cross leg]	To strengthen hip and back muscles and relieves anxiety
Bhujangasana [Cobra]	To strengthen spine

TABLE 5: PHASE 3 ACTIVITIES FOR EXPERIMENTAL GROUP PARTICIPANTS

ACTIVITIES	PURPOSE
Intervention same as included in control group phase 3	
Tadasana [Mountain]	To improve posture and balance
Vrkasana [Tree]	To improve balance, endurance and to strengthen leg muscles
Salabhasana [Locust]	Strengthens the muscles of the spine, buttocks, and backs of the arms and legs. To improve posture

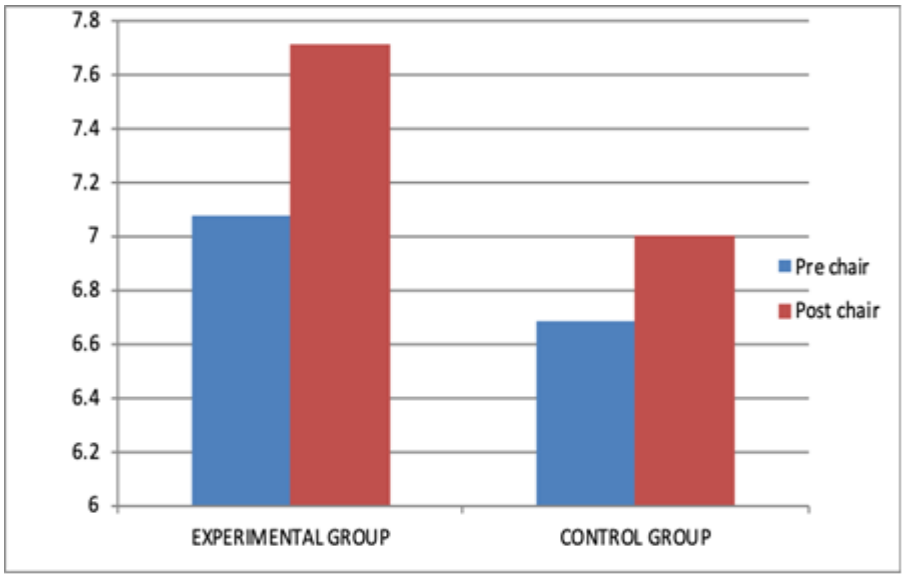
RESULT

Data of 56 participants was collected and analyzed using SPSS v.25.0. The POMA II scale analysis was divided into two components which include balance and gait. Components of balance is divided into that of balance while standing from chair, balance while standing from couch and standing balance. Gait is further divided into components of walk 1,2,3 and 4. Paired t-test was used to obtain mean difference within the group (control and experimental) and independent samples test were conducted to obtain mean difference between each variable and group. Data of pre-intervention and post-intervention period was compared and analyzed. Confidence level was set at 95% and significance was set at $p<0.005$. Table no. 2 shows comparison of mean ± standard deviation (SD) value along with p-value.

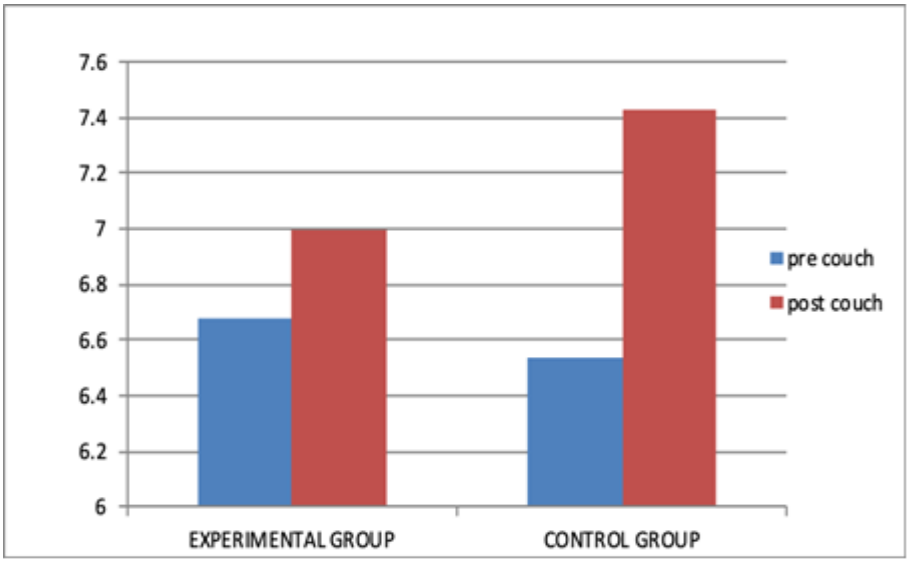
TABLE NO 6: STATISTICAL ANALYSIS OF THE POMA II SCALE DETERMINING MEAN±SD AND P-VALUE

VARIABLES	EXPERIMENTAL GROUP (MEAN±SD)	CONTROL GROUP (MEAN±SD)	P VALUE	
			Experimental	Control
Pre chair balance Post chair balance	7.07±1.156 7.71±1.186	6.68±1.654 7.00±0.659	0.001	0.008
Pre couch balance Post couch balance	6.68±1.124 7.00±0.816	6.54±1.105 7.43±0.742	0.004	0.000
Pre standing balance Post standing balance	8.68±1.311 12.64±1.215	7.64±3.454 8.07±2.360	0.000	0.000
Pre walk 1 Post walk 1	6.21±1.475 6.68±0.905	6.11±1.286 7.00±0.000	0.045	0.001
Pre walk 2 Post walk 2	1.54±0.508 1.82±0.390	1.54±0.508 1.71±0.460	0.003	0.022
Pre walk 3 Post walk 3	6.36±1.420 6.79±0.686	6.18±1.188 6.93±0.262	0.069	0.001
Pre walk 4 Post walk 4	1.54±0.576 1.82±0.390	1.61±0.567 1.75±0.441	0.003	0.212

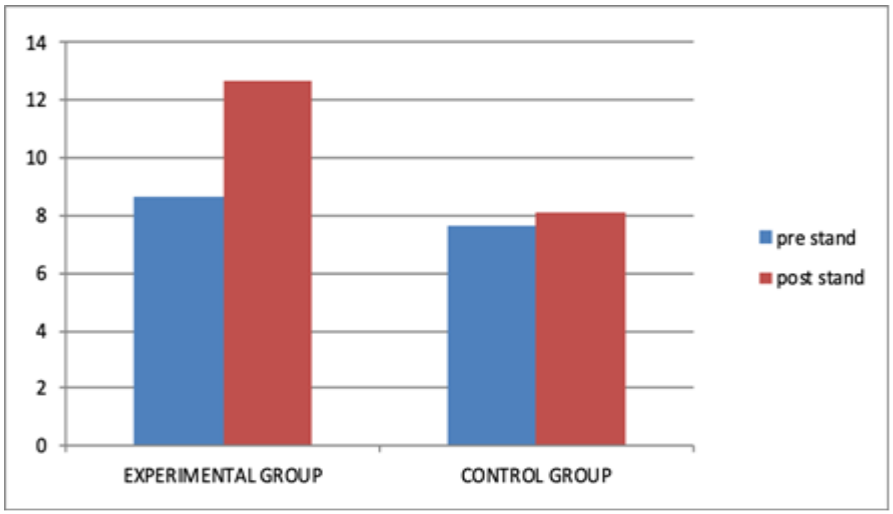
Following graphs represent the difference in the mean values during pre and post-intervention period for all parameters of POMA II scale for control and experimental group.



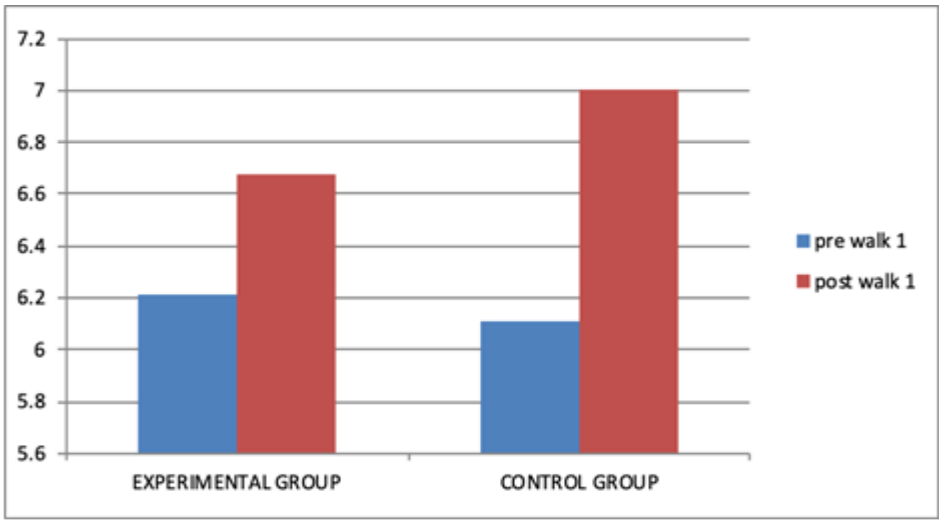
GRAPH 1: COMPARISON OF MEAN VALUE OF BALANCE WHILE STANDING UP FROM CHAIR, PRE AND POST INTERVENTION



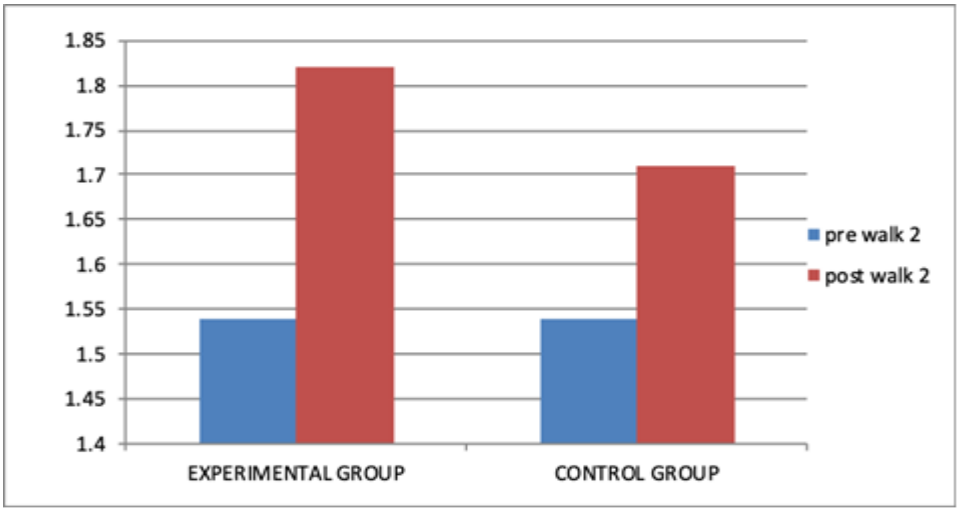
GRAPH 2: COMPARISON OF MEAN VALUE OF BALANCE WHILE STANDING UP FROM COUCH, PRE AND POST INTERVENTION



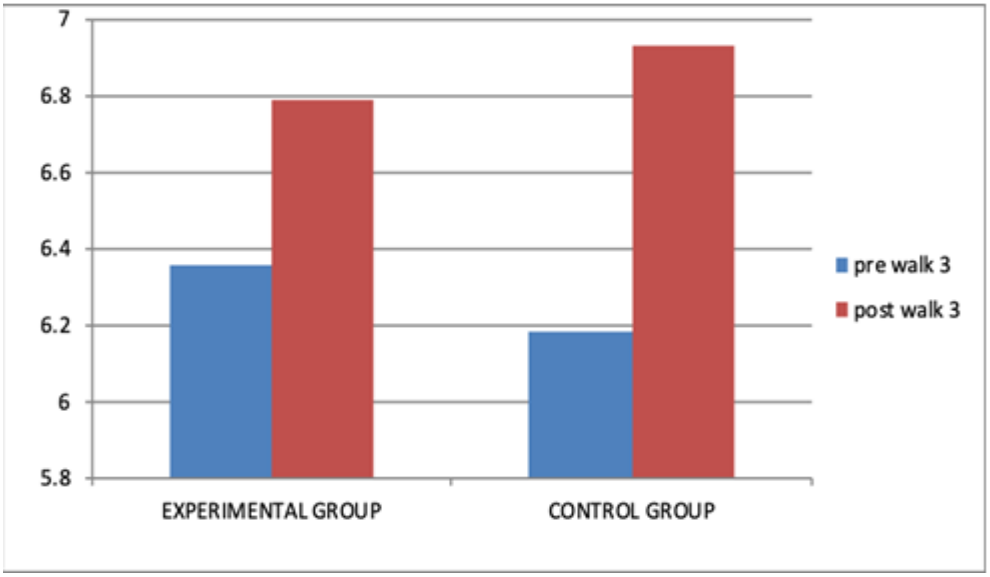
GRAPH 3: COMPARISON OF MEAN VALUE OF STANDING BALANCE, PRE AND POST



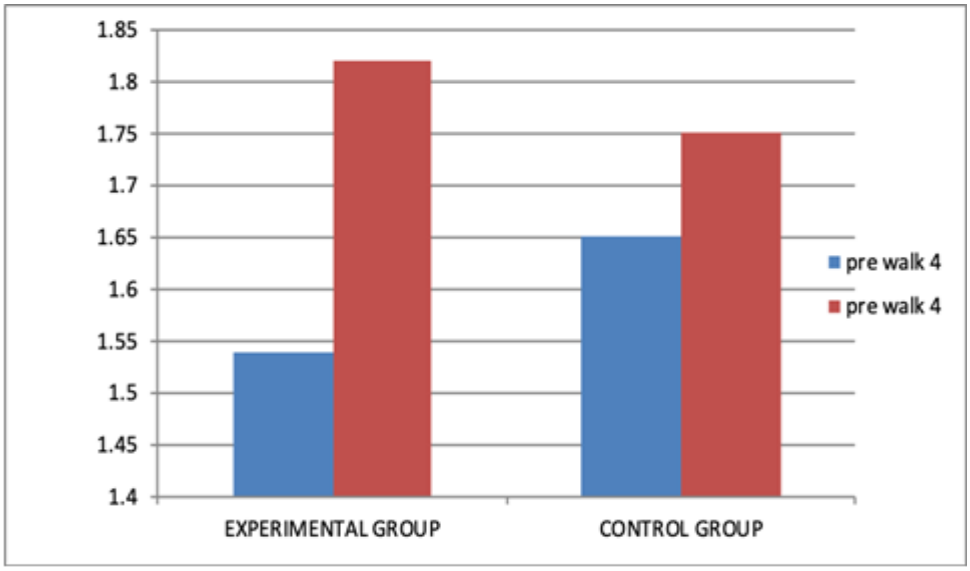
GRAPH 4: COMPARISON OF MEAN VALUE FIRST COMPONENT OF GAIT, PRE AND POST INTERVENTION



GRAPH 5: COMPARISON OF MEAN VALUE SECOND COMPONENT OF GAIT, PRE AND POST INTERVENTION



GRAPH 6: COMPARISON OF MEAN VALUE THIRD COMPONENT OF GAIT, PRE AND POST INTERVENTION



GRAPH 7: COMPARISON OF MEAN VALUE FOURTH COMPONENT OF GAIT, PRE AND POST INTERVENTION

DISCUSSION

Study findings reveal positive findings of both interventions viz. occupational therapy alone and occupational therapy combine with yoga on balance and functional mobility of participants. The difference in improvement in both the group participants was not comparable statistically. Some studies like that by Sabrina Youkhana, Catherine M. Dean and Moa Wolffet al.2016[15], have reported that yoga alone as treatment for balance problems have a smaller impact as compared to when used in combination of other approaches. Clinical benefit of occupational therapy-based activities to improve balance and reduce episodes of falls in elderly population is known. However, studies suggest that it requires more evidence and current research available is scarce[16,17]. Use of POMA II scale in our study was supported by multiple studies[18,19], making it a valid and reliable measure to assess the effectiveness of treatment approaches in our study. Limitations of this study includes limited generalizability, fewer participants. Author recommends a randomized controlled trial on a larger sample size and a longer follow-up to maintain consistency about effectiveness of interventions.

CONCLUSION

Occupational therapy interventions, both alone and in combination with yoga, effectively improved balance and gait in older adults, contributing to a reduced risk of falls. The integration of yoga further enhanced these benefits, highlighting its potential as a valuable adjunct to traditional OT programs. These findings support the idea that integrating holistic approaches like yoga into conventional therapy can play an important role in reducing fall risk and improving mobility among the elderly.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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