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Original Article

Physiotherapy Section

Effect of Otago Exercise Program versus Yoga on Risk of Fall, Gait Speed and Quality of Life in Young-old Population: A Randomised Clinical Trial

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ABSTRACT

Introduction: Ageing results in degenerative changes in the musculoskeletal, vascular, and nervous systems, leading to reduced mobility, postural instability, and loss of independence. These changes increase Risk of Fall (RoF)- a major cause of morbidity in older adults- and negatively impact gait speed and Quality of Life (QoL). Exercise interventions like the Otago Exercise Program (OEP) and yoga improve balance, mobility, and well-being; however, comparative evidence in Indian community settings, particularly among the "young-old" (65-74 years), remains limited.

Aim: To compare the effects of OEP and yoga on RoF, gait speed and QoL in the young-old population.

Materials and Methods: The present randomised clinical trial was conducted in Belagavi, Karnataka, India (July 2024–February 2025) with 48 participants (65-74 years), randomised into Group A (OEP) and Group B (yoga), 24 in each group. Both groups received thrice-weekly sessions (30 min) for four weeks. Outcomes included Berg Balance Scale (BBS), Timed Up and Go (TUG), and Older People's Quality of Life Questionnaire - Brief (OPQOL-Brief) at baseline, week 2, and week 4. Analysis used SPSS 23 with $p<0.05$.

Results: Both groups improved significantly in balance, mobility, and QoL ($p<0.001$). Group A improved BBS from 49.45±2.47 to 54.63±1.47 and TUG from 15.84±1.74 to 11.70±1.02 sec. Group B improved BBS from 48.63±2.67 to 52.59±1.58 and TUG from 16.09±1.68 to 12.50±1.05 sec. QoL improved in both groups, with yoga showing an early advantage at week 2 ($p=0.029$), not sustained at week 4.

Conclusion: Both OEP and yoga improved RoF gait speed, and QoL. OEP provided greater gains in balance and mobility, whereas yoga offered early QoL improvements.

Keywords: Balance, Berg balance scale, Elderly fall, Gait speed

INTRODUCTION

The ageing process, a natural and inevitable biological phenomenon, presents a unique set of physiological, psychological, and functional challenges. The "young-old" population, typically aged 65 to 74 years, often begins to experience subtle but progressive changes in strength, balance, mobility, and overall QoL [1,2]. These degenerative changes are frequently exacerbated by sarcopenia, reduced proprioceptive acuity, multisensory decline, and neuromuscular inefficiencies [3-5]. As a result, this population faces an increased RoFs- an issue of significant public health concern. According to World Health Organisation (WHO), approximately 28-35% of individuals over the age of 65 fall each year, and this percentage increases to 32-42% in those over 70 years [6]. In India, the incidence is equally alarming, with fall prevalence estimated at 31% among older adults [7].

Gait speed is widely recognised as a reliable clinical marker for assessing mobility, functional independence, and predicting RoF and future disability [8,9]. Age-related declines in gait velocity, often due to neuromuscular inefficiencies and cognitive impairments, can signal early loss of autonomy [2]. Research suggests that individuals with a gait speed of less than 1.0 m/s are at increased risk of functional decline and adverse health outcomes [9,10].

Equally important is QoL, a multidimensional construct that encompasses physical, emotional, and social well-being. The presence of chronic diseases, psychological distress, and reduced mobility significantly impair QoL in the elderly [11,12]. The Older People's Quality of Life–Brief (OPQOL-B) questionnaire offers a valid and reliable measure to assess perceived life satisfaction in older adults [13]. Improving QoL in this population requires a comprehensive approach that targets both physical and psychosocial domains, including fall prevention and mental resilience.

Falls are a leading cause of injury, hospitalisation, and mortality in the elderly, and often trigger a cascade of events leading to Fear Of Falling (FoF), social withdrawal, physical deconditioning, and reduced QoL [14-16]. Several intrinsic factors, such as impaired balance, muscle weakness, cognitive decline, and joint degeneration, along with extrinsic factors such as poor lighting, environmental hazards, and improper footwear, contribute to increased RoF [17-19].

The OEP, developed in New Zealand, is an evidence-based intervention incorporating strength, balance, and walking exercises, proven to reduce falls and enhance physical and cognitive function in older adults [20-22]. On the other hand, yoga, a mind-body practice rooted in ancient Indian philosophy, has gained global popularity as a therapeutic intervention for the elderly. It involves controlled breathing, meditative focus, and postures (asanas) aimed at improving flexibility, balance, strength, and proprioception [1,22,23]. Yoga has been particularly effective in reducing FoF, enhancing physical and mental well-being, and promoting self-efficacy in older adults [16,24,25].

Despite its global adoption, research comparing OEP with culturally relevant practices like yoga remains limited in India. Yoga emphasises balance, flexibility, and mindfulness, making it a practical alternative for fall prevention. The present study uniquely compares OEP and yoga in the young-old Indian population, addressing a critical gap in evidence-based geriatric rehabilitation [23]. Despite the proven benefits of both OEP and yoga individually, there is a notable lack of comparative evidence examining their relative effectiveness on RoF,

gait speed, and QoL in the young-old population. Moreover, short-term interventions with time-efficient, community-based formats are of particular interest given the accessibility and compliance challenges in geriatric rehabilitation.

Therefore, this clinical trial aims to evaluate and compare the short-term effects of the OEP and yoga on RoF, gait speed, and QoL in the young-old population. The findings of this study are expected to contribute to developing cost-effective, non pharmacological, and culturally adaptable strategies for geriatric fall prevention and functional wellness.

MATERIALS AND METHODS

The present randomised clinical trial was done in Belagavi, Karnataka, India from July 2024 to February 2025, with participants' assessments at the 0, 2nd, and 4th week of intervention. Assessments were done at the participants' houses and the old age homes. Ethical clearance was obtained from the Institutional Ethical Committee under number- Sl. No 677. Before being enrolled in the study, participants were provided with an explanation of the informed consent and were required to sign a written informed consent form.

Inclusion criteria: Elderly individuals aged 65-74 years, of either sex, who were able to follow commands and walk at least three meters with or without a walking aid, and had mild to moderate balance impairment (BBS score between 21 and 56).

Exclusion criteria: Individuals with recent lower-limb injuries, paresis, limb deformities, recent surgeries, severe cardiovascular, respiratory, or psychological disorders, as well as those diagnosed with vestibular or neurological conditions such as stroke or Benign Paroxysmal Positional Vertigo (BPPV).

Sample size calculation: Sample size calculation for study was done by two tailed sample analysis

α=1.96 (5% Significance level) β=1.03 (85% power)

σ=0.18 d=0.17

$$n=\frac{2(Z_\alpha+Z_\beta)^2*p*q}{d^2}$$

$$n=\frac{2(1.96+1.03)^2*0.18^2}{0.17^2}$$

n=20

20 sample in each group

By considering dropout rate, 24 respondents were included in each group. The initial sample size was determined based on feasibility, expected effect size, and resource availability.

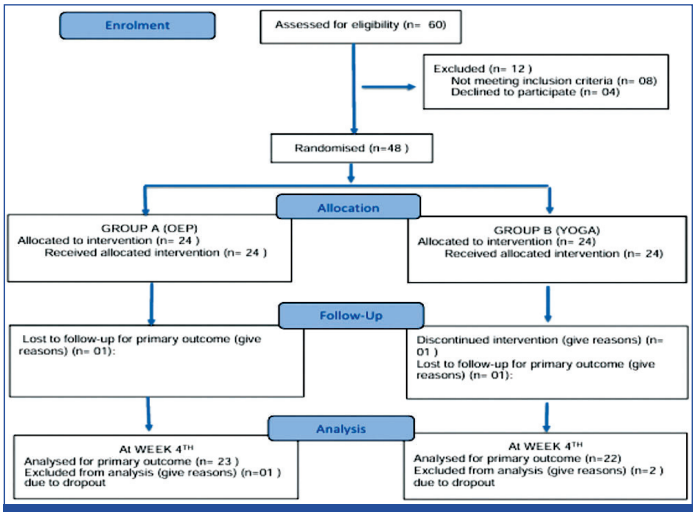
Study Procedure

Each participant's group received its assigned intervention based on the methodology described in the trial. Interventions were delivered by a trained physiotherapist over four weeks at the participant's houses and the old age homes. In Group A (OEP) focused on strengthening exercises, Balance retraining, and walking, Group B (yoga), focus on week-wise asanas.

Outcome measures: During the initial meeting, demographic data were collected, RoF, gait speed and QoL was assessed using the BBS, TUG, and OPQOL-Brief.

1. **Risk of Fall (RoF) using- BBS [26]:** Participants were asked to complete 14 balance tasks, ranging from simple to more challenging movements such as standing from a chair, completing a full rotation, and standing on one foot in front of the other. Each task was rated on a scale from 0 to 4, with 0 indicating the need for assistance and 4 indicating the task was performed safely and independently. The total possible score was 56, which reflected the individual's RoF as low, medium, or high. Intra-rater reliability: 0.98.
2. **Gait speed using-Timed Up and Go test (TUG) test [27]:** Participants were asked to stand up from the chair, walk at their usual pace for about three meters three meters, turn safely, return to the chair, and sit down steadily. The time taken to complete the task was recorded, with a focus on maintaining steadiness and comfort throughout Reliability (ICC 0.80-0.99).
3. **QoL using the OPQOL-BRIEF questionnaire [13,28]:** The OPQOL-Brief questionnaire used in this study comprised 13 items assessing various aspects of participants' QoL. Each item was scored on a 5-point Likert scale, with responses ranging from "Strongly agree" (1) to "Strongly disagree" (5). One item specifically addressed overall QoL, rated from "Very good" (1) to "Very bad" (5). Negatively worded items were reverse-coded so that higher scores consistently indicated better QoL. The total score ranged from 13 to 65, with higher scores reflecting more favorable perceptions. The English version of the OPQOL-Brief, developed by Bowling A et al., [13] was used. ICC=0.904.

A total of 60 participants were assessed for eligibility. Twelve were excluded (seven did not meet inclusion criteria, five declined to participate), and 48 were randomised into two groups: Group A (OEP) and Group B (yoga), each with 24 participants. Three participants dropped out during the intervention phase (one from Group A due to hospitalisation and two from Group B due to relocation). Participants were randomly allocated using the chit method into two groups: group A (OEP) and Group B (yoga), with 24 participants in each group. The intervention was administered for 30 minutes, three times per week, for four weeks, at participants' homes and in old age homes. Outcome measurements were recorded at baseline, at the end of the 2nd week, and at the end of the 4th week [Table/Fig-1].



[Table/Fig-1]: CONSORT flow chart.

Intervention Group A (OEP) [29]: Participants attended 30-minute sessions, three times a week for four weeks, with each session including a 5-minute warm-up, strengthening exercises, balance retraining, walking practice (twice per week), and a 5-minute cool-down [Table/Fig-2,3].

Intervention Group B (yoga) [24]: Participants engaged in 30-minute sessions, three times a week for four weeks. Each session included 5-minute activation phase, 20 minutes of yogasana practice, and 5-minute wind down phase. Each asana was performed five times, holding each position for 10 seconds [Table/Fig-4].

STATISTICAL ANALYSIS

Descriptive statistics (mean and standard deviation) were used to summarise demographic and outcome variables. The Shapiro-Wilk test was applied to assess the normality of continuous variables (BMI). For outcome variables measured across time (BBS, TUG, OPQOL-B), the paired sample Wilcoxon test was used for comparing pretest and post-test scores of BBS, paired sample test was used

Strengthening exs	Level A	Level B	Level C	Level D
1. Knee extensor (front knee strength)	Ankle cuff of 1 kg 10 repetitions of 1 set	Ankle cuff of 1 kg 10 repetitions of 2 set	Ankle cuff of 2 kg 10 repetitions of 1 set	Ankle cuff of 2 kg 10 repetitions of 2 set
2. Knee flexor (back knee strength)	Ankle cuff of 1 kg 10 repetitions of 1 set	Ankle cuff of 1 kg 10 repetitions of 2 set	Ankle cuff of 2 kg 10 repetitions of 1 set	Ankle cuff of 2 kg 10 repetitions of 2 set
3. Hip abductor (side hip strength)	Ankle cuff of 1 kg 10 repetitions of 1 set	Ankle cuff of 1 kg 10 repetitions of 2 set	Ankle cuff of 2 kg 10 repetitions of 1 set	Ankle cuff of 2 kg 10 repetitions of 2 set
4. Ankle plantarflexors (calf raises)	-	-	10 repetitions, hold support, repeat	10 repetitions, no support, repeat
5. Ankle dorsiflexors (toe raises)	-	-	10 repetitions, hold support, repeat	10 repetitions, no support, repeat

[Table/Fig-2]: Intervention for group A (Strengthening Exercises).

Balance Retraining	Level A	Level B	Level C	Level D
1. Knee bends	10 reps, hold support	1. 10 reps, no support Or 2. 10 reps, hold support, repeat	10 reps no support, repeat	3 x 10 reps, no support
2. Backwards walking	-	10 steps, 4 times, hold support	-	10 steps, 4 times, no support
3. Walking and turning around	-	Walk and turn around (make a figure 8) twice, use a walking aid	Walk and turn around (make a figure 8) twice, no support	-
4. Sideways walking	-	10 steps, 4 times, use a walking aid	10 steps, 4 times, no support	-
5. Tandem stance	10 seconds, hold support	10 seconds, no support	-	-
6. Tandem walk	-	-	Walk 10 steps, hold support, repeat	Walk 10 steps, no support, repeat
7. One leg stand	-	10 seconds, hold support,	10 seconds, no hold,	30 seconds, no hold
8. Heel walking	-	-	10 steps, 4 times, hold support	10 steps, 4 times, no support
9. Toe walking	-	-	10 steps, 4 times, hold support	10 steps, 4 times, no support
10. Heel-toe waking backwards	-	-	-	Walk 10 steps, no support, repeat
11. Sit to stand	5 stand, 2 hands for support	5 stands, one hand or, 10 stands, 2 hands for support	10 stands, no support or 10 stands, 1 hands for support, repeat	10 stands, no support repeat
12. Stair climbing	As instructed	As instructed	As instructed	As instructed, repeat

[Table/Fig-3]: Intervention for group A (Balance Retraining Exercise).

to compare the pretest and post-test scores of TUG and OPQOL-brief and to calculate between-group differences over the 4-week intervention period independent Mann-Whitney test was used. A significance level of $p<0.05$ was considered statistically significant. Effect sizes were also calculated to interpret the clinical relevance of the findings. The analysis ensured rigorous evaluation of intervention impact while accounting for variability across participants and timepoints. All analyses were performed using Statistical Package for the Social Sciences (SPSS) version 23.0, IBM, Armonk, NY, USA.

Week 1	Week 2	Week 3	Week 4
Modified sun salutations on chair	Tadasana with chair support (mountain pose)	Tadasana (mountain pose)	Modified sun salutations on chair
Core strengthener on chair	Adhomukhosvanasana (downward dog pose) with chair support	Virabhadrasana (warrior pose)	Vrikshasana (tree pose)
Knee to chest pose on chair	Virabhadrasana (warrior pose) with chair support	Vrikshasana (tree pose) with chair support	Trikonasana (triangle pose)
Leg lifts on chair	Utkatasana (chair pose) with chair support	Trikonasana (triangle pose) with chair support	

[Table/Fig-4]: Intervention for group B (yoga Intervention).

RESULTS

The present study compared the effects of OEP and yoga on RoF, gait speed, and QoL in 45 participants aged 65-74 over four weeks, with 12 sessions and no reported side effects. Outcomes were measured at week 0, week 2, and week 4. A total of 45 participants aged between 65 and 74 years were enrolled and randomly divided into two groups: Group A (OEP, n=23) and Group B (yoga, n=22). Each participant underwent 12 intervention sessions for four weeks. Outcome assessments were performed at baseline (week 0), mid-point (week 2), and post-intervention (week 4). No adverse events were reported during the study period.

Both groups had similar gender distribution, with Group A comprising 11 males and 12 females, and Group B comprising 10 males and 12 females [Table/Fig-5]. The mean ages were comparable between the groups-68.55±2.74 years in Group A and 67.70±3.18 years in Group B (p=0.139). Baseline BMI also showed no statistically significant difference (Group A: 24.71±3.06; Group B: 25.38±4.13; p=0.454) [Table/Fig-6].

Particular		Group		Total
		Group A	Group B	
Gender	Male	11	10	21
	Female	12	12	24
Total		23	22	45

[Table/Fig-5]: Gender based distribution in Group A and Group B.
*p-value <0.005, Group A- Otago Exercise Program (OEP), Group B- yoga

Parameters	Group	Mean±SD	z-value	p-value
Age (in years)	Group A	68.55±2.74	1.479	0.139
	Group B	67.70±3.18		
Height (cm)	Group A	162.27±8.19	0.775	0.438
	Group B	163.39±7.18		
Weight (kg)	Group A	64.59±8.78	0.785	0.432
	Group B	67.52±11.04		
BMI (kg/m^2)	Group A	24.71±3.06	0.749	0.454
	Group B	25.38±4.13		

[Table/Fig-6]: Demographic characteristics of participants (age, height, weight, BMI distribution).
*p-value <0.005, Group A- Otago Exercise Program (OEP), Group B- yoga, SD: Standard deviation

The Shapiro-Wilk test was used to assess the normality. For intervention outcomes like the BBS, TUG, and OPQOL-Brief, normality of residuals was assessed. Most outcome measures were non-normally distributed ($p<0.05$), except Group B's BBS at baseline (p=0.119) and Group A's TUG at week 4 (p=0.102). OPQOL consistently showed non-normality (p=0.001) [Table/Fig-7].

Within-group BBS scores significantly improved across all time points. Group A's BBS increased from 41.73±2.96 (week 0) to 43.77±3.65 (week 2) and 46.41±4.02 (week 4), with a total mean difference of 4.68 and a large effect size (3.54). Group B also showed significant improvement from 41.61±3.23 to 45.70±3.87

(mean difference=4.09, effect size=2.96), but the magnitude of improvement was lower than Group A [Table/Fig-8].

Variables	Time Frame	Group A		Group B	
		z-value	p-value	z-value	p-value
Berg Balance Scale (BBS)	Week 0	0.887	0.017	0.932	0.119
	Week 2	0.844	0.003	0.888	0.015
	Week 4	0.888	0.017	0.874	0.008
Timed Up and Go (TUG)	Week 0	0.899	0.028	0.832	0.001
	Week 2	0.907	0.040	0.888	0.015
	Week 4	0.926	0.102	0.900	0.025
Older People's Quality of Life (QoL)	Week 0	0.862	0.006	0.841	0.002
	Week 2	0.797	0.001	0.815	0.001
	Week 4	0.730	0.001	0.740	0.001

[Table/Fig-7]: Normality of week 0, week 2, and week 4 scores of all parameter scores in Group A and Group B using using Shapiro-Wilk test.
*p-value <0.005, Group A: Otago Exercise Program (OEP); Group B: yoga, SD: Standard deviation

Groups	Times	Mean±SD	Mean Diff.±SD Diff.	Effect size	z-value	p-value
Group A	Week 0	41.73±2.96	2.05±0.90	1.30	4.169	0.001
	Week 2	43.77 ±3.65				
	Week 2	43.77±3.65	2.64±0.90	1.27	4.137	0.001
	Week 4	46.41±4.02				
	Week 0	41.73±2.96	4.68±1.32	2.29	3.54	0.001
	Week 4	46.41±4.02				
Group B	Week 0	41.61±3.23	1.35±0.93	1.59	3.90	0.001
	Week 2	42.96±3.62				
	Week 2	42.96±3.62	2.74±1.10	1.37	4.16	0.001
	Week 4	45.70±3.87				
	Week 0	41.61±3.23	4.09±1.38	2.12	4.23	0.001
	Week 4	45.70±3.87				

[Table/Fig-8]: Comparison of pretest and post-test scores of the Berg Balance Scale (BBS) in two Groups by the paired sample Wilcoxon test.
p-value <0.005, Group A: Otago Exercise Program (OEP), Group B: yoga, SD: Standard deviation

TUG scores also improved notably. Group A showed a significant reduction from 17.00 to 13.77 seconds (p=0.001), while Group B decreased from 16.78 to 14.00 seconds (p=0.001), both indicating better mobility [Table/Fig-9].

Groups	Times	Mean±SD	Mean Diff.±SD Diff.	Effect size	z-value	p-value
Group A	Week 0	17.00±2.20	1.55±1.18	1.30	3.915	0.001
	Week 2	15.45±2.46				
	Week 2	17.00±2.20	1.68±1.32	1.27	3.632	0.001
	Week 4	13.77±2.39				
	Week 0	15.45±2.46	3.23±1.41	2.29	4.060	0.001
	Week 4	13.77±2.39				
Group B	Week 0	16.78±3.15	1.30±0.82	1.59	4.04	0.001
	Week 2	15.48±3.40				
	Week 2	16.78±3.15	1.48±1.08	1.37	3.79	0.001
	Week 4	14.00±3.22				
	Week 0	15.48±3.40	2.78±1.31	2.12	4.23	0.001
	Week 4	14.00± 3.22				

[Table/Fig-9]: Comparison of pretest and post-test scores of Timed Up and Go (TUG) in two Groups by paired sample test
p-value <0.005, Group A- Otago Exercise Program (OEP), Group B- yoga,
SD: Standard deviation

In terms of QoL, Group A's OPQOL scores increased from 53.73±3.38 to 57.86±4.84 at week 2 (mean difference=4.14, effect size=0.92), and to 61.18±3.78 at week 4 (total improvement=7.45, effect size=1.60). Group B improved from 54.70±3.25 to 60.74±1.96 at week 2 (effect size=2.10), reaching 61.70±3.89 by week 4. However, the gain between week 2 and 4 in Group B was minimal and statistically non-significant (p=0.119), suggesting early plateauing [Table/Fig-10]. The Mann-Whitney U test indicated no statistically significant between-group differences in BBS and TUG scores at any time point. However, OPQOL at week 2 showed a significant difference favoring the yoga group (p=0.029), which was not maintained by week 4 (p=0.453) [Table/Fig-1,11].

Groups	Times	Mean±SD	Mean Diff.±SD Diff.	Effect size	z-value	p-value
Group A	Week 0	53.7± 3.38	4.14±4.51	0.92	2.992	0.003
	Week 2	57.86±4.84				
	Week 2	53.73±3.38	3.32±6.92	0.48	2.021	0.043
	Week 4	61.18±3.78				
	Week 0	57.86±4.84	7.45±4.78	1.60	2.021	0.001
	Week 4	61.18±3.78				
Group B	Week 0	54.70±3.25	6.04±2.88	2.10	4.24	0.001
	Week 2	60.74±1.96				
	Week 2	54.70±3.25	0.96±4.26	0.22	1.56	0.119
	Week 4	61.70±3.89				
	Week 0	60.74±1.96	7.00±4.33	1.60	3.85	0.001
	Week 4	61.70± 3.89				

[Table/Fig-10]: Comparison of pretest and post-test scores of older people's Quality of Life (QoL) in two groups by paired sample test.

Variables	Time	Group	Mean±SD	z-value	p-value
Berg Balance Scale (BBS)	Week 0	Group A	41.73±2.96	0.035	0.972
		Group B	41.61±3.23		
	Week 2	Group A	43.77±3.65	0.465	0.642
		Group B	42.96±3.62		
	Week 4	Group A	46.41±4.02	0.393	0.694
		Group B	45.70±3.87		
Timed Up and Go (TUG)	Week 0	Group A	17.00±2.20	0.581	0.561
		Group B	16.78±3.15		
	Week 2	Group A	15.45±2.46	0.508	0.611
		Group B	15.48±3.40		
	Week 4	Group A	13.77±2.39	0.092	0.926
		Group B	14.00±3.22		
Older People's Quality of Life (QoL)	Week 0	Group A	53.73±3.38	1.016	0.310
		Group B	54.70±3.25		
	Week 2	Group A	57.86±4.84	2.182	0.029
		Group B	60.74±1.96		
	Week 4	Group A	61.18±3.78	0.751	0.453
		Group B	61.70±3.89		

[Table/Fig-11]: Between-groups independent Mann-Whitney test.

Effect size comparisons from baseline to week 2 showed that Group A had a stronger improvement in balance (BBS: 2.28), while Group B showed better early improvements in TUG (1.59) and OPQOL (2.10). Between weeks 2 and 4, Group A sustained higher gains in BBS (2.92 vs. 2.50), whereas Group B retained a slight advantage in TUG (1.37 vs. 1.27). OPQOL effect sizes were greater in Group A (0.48 vs. 0.22) [Table/Fig-12-14].

DISCUSSION

The present randomised trial aimed to compare the effects of the OEP and yoga on RoF, gait speed, and QoL among community-

Variables	Group	Effect size (W0 - W2)	Result
Berg Balance Scale (BBS)	Group A	2.28	Group A is better
	Group B	1.44	
Timed Up and Go (TUG)	Group A	1.30	Group B is better
	Group B	1.59	
Older People's Quality of Life (QoL)	Group A	0.92	Group B is better
	Group B	2.10	

[Table/Fig-12]: Comparison of treatment outcome based on effect size (Week 0 to Week 2).
(Based on the paired sample t-test and Cohen's D Clinical Effect Size, we could conclude that group B has indicated a better outcome post-treatment with a higher value.)

Variables	Group	Effect size (W2 - W4)	Result
Berg Balance Scale (BBS)	Group A	2.92	Group A is better
	Group B	2.50	
Timed Up and Go (TUG)	Group A	1.27	Group B is better
	Group B	1.37	
Older People's Quality of Life (QoL)	Group A	0.48	Group A is better
	Group B	0.22	

[Table/Fig-13]: Comparison of treatment outcome based on effect size (Week 2 to Week 4).
(Based on the paired sample t-test and Cohen's D clinical effect size, we could conclude that group A has indicated better outcome post treatment with a higher value)
Note: higher the effect size better is the clinical improvement post treatment.

Variables	Group	Effect size (W0 - W4)	Result
Berg Balance Scale (BBS)	Group A	3.54	Group A is better
	Group B	2.96	
Timed Up and Go (TUG)	Group A	2.29	Group A is better
	Group B	2.12	
Older People's Quality of Life (QoL)	Group A	1.60	Group A is better
	Group B	1.60	

[Table/Fig-14]: Comparison of treatment outcome based on effect size (Week 0 to Week 4).
(Based on the paired sample t-test and Cohen's D clinical effect size, we could conclude that Group A has indicated a better outcome post-treatment with a higher value).
Note: the higher the effect size better is the clinical improvement post-treatment.

dwelling older adults aged 65-74 years. [2] Both interventions produced statistically significant improvements across all outcome measures- BBS, TUG and the OPQOL-B- from baseline to week 4. While both groups improved, yoga showed earlier gains in QoL, whereas Otago demonstrated a stronger effect on balance by week 4. These results highlight the value of both programs in promoting physical function and psychosocial well-being in the young-old population.

Participants were aged between 64 and 75 years, targeting the "young-old" group as defined by the WHO and ACSM [2]. This subgroup was selected for their higher functional reserve and adaptability to structured interventions [2]. Early aging-related changes, including sarcopenia, proprioceptive decline, and reduced postural control, increase RoF during this stage [17]. Singh DK et al., and Campbell AJ et al., have shown that targeted interventions in this group enhance mobility, mitigate falls, and preserve independence [29,30].

The gender distribution was nearly equal (Group A: 10 male/12 female; Group b: 11 male/12 female), reducing sex-based bias and improving generalisability. Although falls affect both genders, women-especially postmenopausal are at higher risk of balance impairments due to hormonal and musculoskeletal changes [21,31]. Similar to findings by Sherrington C et al., and Liu-Ambrose T et al., both men and women benefited from structured interventions like Otago and yoga in the present study [32,33].

Both groups demonstrated statistically significant improvements in BBS scores. Group A improved from 49.45±2.47 to 54.63±1.47, while Group B improved from 48.63±2.67 to 52.59±1.58. There was improvement in the balance in both the groups, which leads to improvement in functional mobility in otago group [6]. This aligns with Campbell AJ et al., who observed reduced RoF in older women following Otago training [29]. Otago's dynamic balance and lower-limb strengthening components improve neuromuscular control, while Sherrington C et al., emphasised the role of challenging balance exercises in fall prevention [32].

Yoga also improved balance outcomes, attributed to enhanced proprioception, core strength, and body awareness. Studies by Galantino ML et al., and Tiedemann A et al., report similar improvements in community-dwelling older adults following structured yoga sessions, particularly those adapted for safety and accessibility [24,34].

In the TUG test, both groups showed mobility improvements. Group A improved from 15.84±1.74 to 11.70±1.02 seconds, while Group B improved from 16.09±1.68 to 12.50±1.05 seconds. These findings reflect improvements in gait speed and coordination, supported by Gillespie LD et al., and Robertson MC et al., who reported TUG enhancements following Otago-based interventions [31,35]. Functional movements such as sit-to-stand and step-ups in OEP likely contributed to these improvements. Yoga's gains in TUG may stem from increased flexibility, postural alignment, and controlled breathing, as reported by Oken BS et al., and Chen KM et al., [36,37].

Regarding QoL, both groups showed significant improvements. OPQOL scores in group A increased from 86.31±2.51 to 91.95±1.83 and in Group B from 86.81±2.28 to 92.45±1.68. At week 2, the yoga group showed significantly higher QoL improvements (p=0.029), suggesting an early psychosocial benefit likely due to the integrative nature of yoga, including relaxation, mindfulness, and breath control. This finding is consistent with Hariprasad VR et al., and Sivaramakrishnan D et al., who emphasised yoga's role in emotional well-being, resilience, and life satisfaction [38,39].

While Otago focused more on physical health, it also indirectly improved confidence and reduced FoF, both of which positively influenced QoL. Liu-Ambrose T et al., noted similar outcomes in older adults undergoing strength and balance training, attributing improved psychosocial scores to enhanced autonomy and participation in daily life [33].

Limitation(s)

The first limitation was that with a short intervention period, the results may not reflect long-term outcomes. The absence of a control group and the inability to blind participants could have introduced bias. Participants' activity levels outside the sessions were not tracked, which may have influenced the results. Since the study was conducted at a single geographical area, the findings may not be broadly generalisable. Finally, the lack of follow-up limits our understanding of the lasting impact of the interventions.

CONCLUSION(S)

Both the OEP and yoga effectively improved balance, gait speed, and QoL in the young-old population. Yoga showed earlier gains in perceived QoL, while Otago led to greater long-term improvements in balance and function. Effect size analysis indicated that Otago was more effective overall. Both interventions can serve as effective can be used as community-based strategies for fall prevention and healthy aging.

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