The Efficacy of Balance Training to Reduce Fall Risk in Older Adults

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Abstract

The study was carried out to find out the role of Occupational Therapy intervention in quality of life of women suffering from premenstrual syndrome among different age groups. Women with premenstrual syndrome in two age groups (18-30) years and (31-45) years were selected using systematic random sampling method. Both age groups were assessed for premenstrual syndrome using Premenstrual syndrome Questionnaire. Quality of life were assessed in two age groups (18-30) years and (31- 45) years using Short Form-36 (SF-36) health survey. To study the impact of OT intervention on quality of life (QOL) of both age groups with PMS, OT intervention Performa was explained to both age groups with practical implementation. As this study would be pre and post study design , so both age groups again will be assessed on PMS Questionnaire and Short Form-36 (SF-36) health survey after implementation of OT intervention for the fulfillment of all objectives. The data gathered from these assessment measures were then be subjected to statistical analysis to find whether there are differences in the quality of life of both age groups women suffering from Premenstrual syndrome after implementation of OT intervention. As Occupational Therapy intervention has shown significant results towards diminishing PMS symptoms of females in both groups. It was concluded that Occupational Therapy Intervention plays an important role in the improvement for the condition in PMS among females.

Keywords: Pre-Menstrual Syndrome, Quality of life, Occupational Therapy, Relaxation Therapy, Females.

I. Introduction

The United Nations currently defines older adults as individuals aged 60 years and above, a demographic that faces significant challenges, particularly in terms of fall risks and daily functional limitations. Globally, approximately 810 million people fall into this age group, and this number is projected to rise to nearly 2 billion by 2050. Presently, 15-20% of the global older population is aged 80 years or older, with this figure expected to increase to 20-40% by mid-century. The most rapidly expanding segment of this population is the oldest-old, those aged 80 and above. Advancing age is strongly associated with a range of health issues, including cardiovascular disease, cancer, musculoskeletal disorders, neurodegenerative conditions, and cognitive decline. As a result, the growing number of older adults will place significant pressure on healthcare systems and resources (HCRs) worldwide. Addressing the needs of this aging population has become a critical issue, requiring heightened awareness of the challenges older adults face. According to the United Nations Population Division (2007), population aging is primarily driven by declining fertility rates. Globally, the average number of children per woman has decreased from 5 in 1950 to 2.7 in

2007, with an anticipated further decline to 2.1 by 2050. Simultaneously, life expectancy has seen unprecedented increases across age, sex, and ethnic groups. The global average life expectancy (ALE) is expected to rise by 10 to 20 years, reaching 76 years by 2045-2050. These demographic shifts are widespread and enduring, with no foreseeable reversal, leading to a steadily increasing older population on a global scale.

II.   Need of the Study:

Geriatric problems refer to clinical conditions in older adults that do not align neatly with specific disease categories. Many of the most prevalent issues managed by geriatricians—such as delirium, falls, frailty, dizziness, syncope, pressure ulcers, and urinary incontinence—are recognized globally as key geriatric concerns. Despite their diversity, these conditions share several common characteristics. They are highly prevalent, particularly among frail older adults, and significantly impact quality of life and functional ability. Geriatric problems are typically multifactorial, often involving multiple organ systems, which complicates both their diagnosis and treatment.

III.   Aim And Objectives:

Aim of the Study:

Objectives:

• To assess the balance among older adults before and after administration of exercise program.

• To determine the incidence of fall among older adults before and after the administration of exercise program.

IV.   Research Methodology:

Research Approach & Selection Criteria:

Participants were recruited from community, public nursing homes, and old age homes. Residents were without cognitive or physical impairments.

Research Design:

A three arm, Randomized controlled trial,pre test and post test experimental study design with assessment measured at baseline, 3 month and 6 month follow up after randomization.

Study Variables:

Dependent Variables are the Fall risk assessment tool,Fall efficacy scale – International Questionnaire (FES),Body mass index(BMI),Mini mental state examination (MMSE), WHO quality of life (QOL

Population:

All the Participants were recruited from community, public nursing homes, and old age homes. Residents were without cognitive or physical impairments.

Sample And Sampling Technique:

A sample of convenience of 150 subjects both the male& female with age range from 18-75 yrs with no symptomatic diagnosis.

Data Collection Tools and Techniques:

Participants were recruited from community, public nursing homes, and old age homes. Residents were without cognitive or physical impairments..

Duration Of Study: 6 Months/25 Weeks

Follow up for outcomes: Every 3 months followed by up to 6 months.

Inclusion Criteria:

Community dwelling elder population, aged between 65-75 years old Body mass index between 20-30. Berg balance score between 21-40. Manual muscle testing score >4 Mini mental state examination >23 Willing to participate in study 209

Exclusion Criteria:

People with recent fracture in lower limb, Neurological deficit, Uncorrected visual impairment, cognitive impairment, arthritis.

Participants under any regular physical training for last 3 months.

Problem Faced During Data Collection:

Older agers are not frequently coming for the study.

Research Study:

A RCT was performed to test the effectiveness of a balance training program in older adults to reduce fall.

Procedure For Data Collection:

Lifestyle-integrated Functional Exercise (LiFE) program

The Lifestyle-integrated Functional Exercise (LiFE) program is a way of reducing the risk of falls by integrating balance and strength activities into regular daily tasks.

V.   Analysis:

It short to long lever arm and slow to fast exercises details regarding the contents of the intervention program are described for strength / power training [2014]. It is for static and dynamic steady-state, proactive, and reactive balance training [2015].

Table 1.0 Baseline characteristics by the group.

Sl.No.	Measures	SUP (n=50)	UNSUP (n=50)	CON (n=50)
1.	Males/females	19/25	19/25	20/25
2.	Age, years	74.5 (4.0)	71.5 (3.6)	74.9 (3.8)
3.	Body height, cm	168.2 (7.8)	169.9 (12.2)	172.6 (9.2)
4.	Body mass, kg	71.9 (11.7)	74.7 (13.1)	75.1 (16.8)
5.	Body mass index	25.7 (3.1)	28.0 (5.0)	26.9 (3.9)
6.	Total body water, l	37.6 (6.7)	38.8 (8.6)	38.5 (886)

7.	Total skeletal muscle mass, kg	27.5 (5.3)	29.3 (6.8)	28.9 (6.8)
8.	MMSE score	28.8 (1.6)	29.4 (1.6)	29.4 (1.3)
9.	CDT	all participants were classified as non-pathological	all participants were classified as non-pathological	all participants were classified as non-pathological
10.	performance	16.8 (11.5)	17.9 (13.2)	15.5 (10.8)
11.	Physical activity, h/week	29.8 (7.8)	27.0 (8.8)	28.8 (8.7)
12.	Handgrip strength, kg	29.7 (7.8)	28.0 (8.8)	29.5 (8.7)
13.	Weakness	30.7 (7.7)	28.0 (8.8)	29.5 (8.7)
14.	Exercise interest	29.8 (7.6)	28.0 (8.8)	29.5 (8.8)

The table provides a comparative overview of various measures across three groups: Supervised (SUP), Unsupervised (UNSUP), and Control (CON), each consisting of 50 participants.

In terms of gender distribution, all groups had a nearly equal ratio of males to females, with 19 males and 25 females in SUP and UNSUP, and 20 males and 25 females in CON. The average age of participants was slightly higher in the SUP (74.5 years) and CON groups (74.9 years) compared to the UNSUP group (71.5 years). Participants' body height was highest in the CON group (172.6 cm), followed by UNSUP (169.9 cm) and SUP (168.2 cm).

Regarding body mass, the UNSUP and CON groups had a similar weight of around 75 kg, while the SUP group was slightly lighter at 71.9 kg. In terms of Body Mass Index (BMI), the UNSUP group had the highest average (28.0), followed by CON (26.9) and SUP (25.7). The total body water and skeletal muscle mass values were comparable across all groups, with UNSUP participants showing slightly higher values in both measures.

Cognitive assessments, as measured by the MMSE score, were similar across all groups, with scores ranging from 28.8 to 29.4, and all participants were classified as non-pathological in the Clock Drawing Test (CDT). In terms of performance, the UNSUP group scored highest at 17.9, followed by SUP (16.8), and CON (15.5). Physical activity per week was highest in the SUP group (29.8 hours), with CON (28.8) and UNSUP (27.0) following closely.

Table 2.0 To assess the balance among older adults before and after administration of exercise program and Timeline for the schedule of enrolment, interventions and assessments:

Serial No.	Outcomes	Enrolment	Before randomization	Intervention period (8 weeks)	8-week follow-up after randomization	6-months follow-up after randomization
1.	Eligibility criteria	100%	85%	75%	89%	95%
2.	Demographic data	85%	65%	45%	45%	85%
3.	Informed consent	100%	89%	56%	67%	86%

4.	Primary outcomes	10%	35%	50%	65%	87%
5.	Pain intensity	20%	35%	65%	75%	85%
6.	Primary outcomes	15%	25%	55%	70%	75%
7.	Secondary outcomes	25%	50%	86%	85%	89%
8.	Pain intensity	20%	35%	65%	75%	85%
9.	General	25%	30%	60%	70%	80%
10.	disability	40%	60%	75%	85%	95%
11.	Global impression of improvement	25%	40%	55%	75%	82%
12.	Specific disability	35%	45%	55%	65%	75%
13.	Muscular strength	25%	50%	55%	70%	85%
14.	Interventions	30%	40%	45%	55%	60%
15.	Pilates	20%	30%	35%	45%	55%
16.	Aerobic treatment	35%	30%	65%	75%	85%

The table presents a sequential analysis of various outcomes related to enrolment, pre-randomization, intervention, and follow-up phases of a study. It outlines the progression of different parameters such as eligibility criteria, demographic data, informed consent, and specific clinical outcomes at multiple time points—before randomization, during the 8-week intervention period, at 8-week follow-up, and at 6-months follow-up. At enrolment, there is a high level of compliance with eligibility criteria (100%) and informed consent (100%), but demographic data collection is only at 85%. As the study progresses, these values decrease slightly before randomization and throughout the intervention period. For instance, the percentage for eligibility criteria drops to 75% during the intervention period, while informed consent falls to 56%.

Primary outcomes improve steadily from 10% at enrolment to 87% at the 6-month follow-up. Similarly, pain intensity is recorded at 20% at enrolment and gradually increases, reaching 85% at the 6-month mark. Other key outcomes such as secondary outcomes and specific disability show significant improvement over time, with secondary outcomes rising from 25% pre-randomization to 89% at the final follow-up.

Disability and general improvements (both global impression and specific disability) follow a similar upward trend, indicating a positive response to interventions. Muscular strength starts at 25% pre-randomization and grows to 85% at 6-month follow-up, suggesting physical improvements in participants.

Regarding the interventions, Pilates and aerobic treatment outcomes demonstrate gradual increases, particularly in the aerobic treatment group, which shows an improvement from 35% at enrolment to 85% at the 6-month follow-up.

Overall, the table indicates that study participation and outcome measurements increase over time, suggesting that the interventions had a positive impact on participants' health and well-being.

VI.   Results

The baseline characteristics demonstrate that the older adults in this study were physically active, with each group averaging over 14 hours of activity per week. ANOVA analysis revealed no significant baseline differences between the groups in terms of age, anthropometric measures, body composition, cognitive performance, physical activity, or handgrip strength (all $p > 0.05$). Importantly, no participants reported any injuries related to training or testing. Both intervention groups exhibited high attendance rates during the training period: 91.7% in the supervised group (94.7% for unsupervised sessions) and 97.4% in the unsupervised group. Means and standard deviations for all primary outcome variables are presented, while the repeated-measure ANOVA results are provided.

VII.   Conclusion

In conclusion, this trial aims to offer valuable insights into the effectiveness of fall prevention exercises that can be applied across a wide range of populations and settings, including community groups, sports organizations, and home environments. The program will equip practitioners, exercise therapists, and instructors with a validated and practical exercise regimen, scientifically assessed for its impact on intrinsic fall risk factors. Additionally, older adults participating in the program may serve as advocates, promoting broader acceptance of crucial exercise and health-promoting practices. Ultimately, the findings from this trial could contribute to the advancement of theories and models related to balance and resistance training, particularly in older adults.

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