International Journal of Applied Research 2025; 11(10): 163-166

International Journal of Applied Research

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor (RJIF): 8.69
IJAR 2025; 11(10): 163-166
www.allresearchjournal.com
Received: 02-07-2025
Accepted: 05-08-2025

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Effect of egoscue exercises on fear of fall and instrumental activities of daily living in community dwelling elders

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DOI: https://www.doi.org/10.22271/allresearch.2025.v11.i10c.12934

Abstract
Background: Elderly people's fear of falling may lead to undue care, motor limitations and deficiency of autonomy, which cause their motor skills to deteriorate. Analysing the ability of the elderly person's health to participate in daily life activities is a way of assessing their health status. Participating in daily activities promotes independence, health, social participation and achievements. Thus, it's critical to make an effort and make plans to uphold and advance the daily living activities of the elderly. Many interventions have been shown to reduce pain, to reduce fear of fall and to strengthen muscles, but there is paucity of research done to understand the effect of Egoscue exercises on fear of fall and activities of daily living in community dwelling elders. Our study aims at determining the effect of Egoscue exercises on fear of fall and Instrumental activities of daily living in community dwelling elders.
Methods: 30 subjects aged 65-75 years with fear of fall were assessed and treated with the egoscue exercise. Outcome measures used were Falls Efficacy Scale (FES) and Lawton Broady Scale (LBS) that was measured pre and post intervention.
Results: Statistical analysis showed that statistical significance (p<0.001) was seen in Fall efficacy scale and also in Lawton Brody Instrumental activities of daily living with effect size of 1 and -1 respectively.
Conclusion: Fear of fall was significantly decreased and ability to perform Instrumental activities of daily living was improved in the geriatric age group after 4 weeks of performing Egoscue exercise.

Keywords: Egoscue exercise, fear of fall, elderly population, instrumental activities for daily living

Introduction
According to the law, a "senior citizen" means any person being a citizen of India, who has accomplished the age of sixty years or above. According to Population Census 2011 there are nearly 104 million elderly persons (aged 60 years or above) in India; 53 million females and 51 million males [1].

Fear is a primary cause of physical disability in the elderly [2, 3, 4]. The frequency of fear of falling (FOF) in the elderly age group is from 20% to 40% [2, 5]. 60% of elders who have a past history of fall are more likely to re-experience [2, 6]. The majority of the geriatric patients who were hospitalized after fall, fail to go back to their earlier level of activity, and those who encounter falls frequently are more scared of falling than those who experience it rarely [2, 7]. Fear of falling in the elderly can result in disproportionate care, motor limitations, and lack of independence which can lead to decline in their motor functions [2, 8]. Prior falls, sense of unsteadiness, reduced wellbeing, believing they are unable to do normal activities (low falls self-efficacy), decreased capacity to carry out ADLs, weakness, Deprived foresight, Lack of loving friends or family to provide emotional care, Inactive way of living are some of the reasons older people can or may have fear of fall.

Activities of daily living are the chief factor altering the geriatric population [2, 9]. There are three levels of functional status assessment in the elderly i.e. basic, instrumental, and advanced activities of daily living [2, 10]. The instrumental activities of daily living include purchasing for groceries, driving, performing chores, cooking food, prescribed medicines on time and handling finances; One of the studies showed that fear of falling was the reason for

43.15% of elderly aged people for reducing their activities [11], in addition to decreased activity levels the also possible reason could be the history of fall [6, 12].
However, a association has been established between Fear of Fall (FOF), Quality of Life (QOL), basic activities of daily living (BADL) and Instrumental activities of daily living (IADL) in elderly women according to prior studies [12, 13, 14]. The presence of Fear OF falling in the geriatric age group is directly proportional to their reduced QOL, disrupted basic ADL and Instrumental ADL [16]. The physiology of Egoscue exercise implements spinal corrective exercises to enhance whole body postural alignment by correcting the mobility and stability of the joint [17, 18, 19]. The Egoscue Method, which works on mechanism of corrective exercises, makes the declares to mend both body alignment and chronic pain [17].
The main aim of this research was to determine the effects of Egoscue Exercises on fear of fall and Instrumental activities of daily living on community dwelling elders.

Methods

Ethical clearance and permission to conduct the study was granted by the Institutional Ethical Committee. A total number of participants participated in this study was 30 (n=30). This study included subjects with fear of fall aged between 65-75 years recruited from in and around Pune city. Subjects were included with scores between 9-13 (moderate concern) on falls self-efficacy scale, able to understand English, Hindi and Marathi and willing to participate. Exclusion criteria included subjects that had undergone knee or hip surgery, sustained hip or knee injury in past 12 months, had any lower limb deformity or if had any balance issues, vertigo or cerebellar disorders.

Outcome Measures

Outcome measures included the Falls Efficacy Scale–International (FES-I) and the Lawton Brody Instrumental Activities of Daily Living (IADL) Scale. The FES-I is a 16-item questionnaire assessing fall-related self-efficacy, with scores ranging from 16 to 56; higher scores indicate lower self-efficacy and greater concern about falling. It demonstrates high reliability (0.9) [20]. The Lawton Brody IADL Scale assesses complex daily activities required for independent living, comprising eight items with a total score from 0 (low function) to 8 (high function). It is quick to administer (10–15 minutes) and shows good reliability (0.85) and validity. Both the scales were taken pre as well as post intervention to note the readings [21].

Procedure: Subjects were assessed for fear of fall and Instrumental activities of daily living using Falls Efficacy scale and Lawton Brody scale. Subjects were included on the basis of inclusion and exclusion criteria. Written informed consent was taken after the complete explanation of the risk and benefits of the procedure and treatment from the subjects. The patients were made to perform all 10 exercises included in the set of Egoscue exercises for 2 repetition each that are static back, overhead extension, pelvic tilts, air bench (fig1), static wall (fig 3), supine groin progessive stretch, abductor press, assisted runners stretch, abdominal contraction with static back which required approximately 45 mins for 3 days a week for 4 weeks. The subjects were evaluated at the beginning of the treatment and re-evaluated after 4 weeks post intervention.

Air bench Spinal twist Static wall

Results

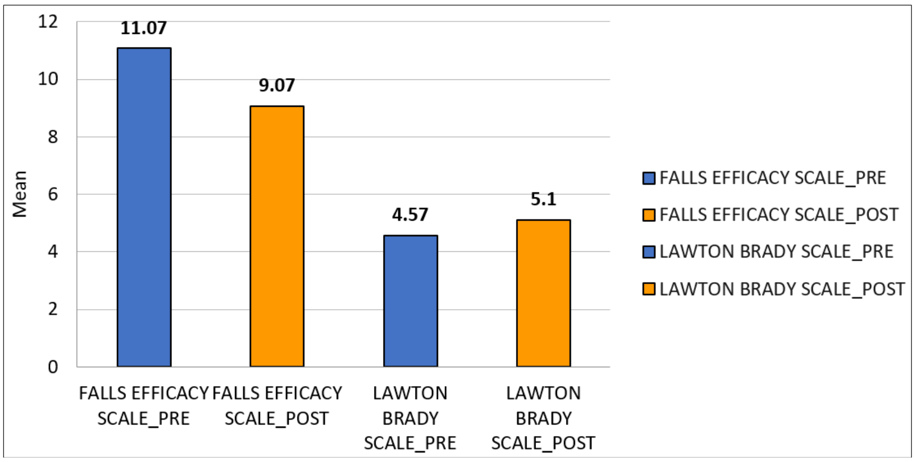
Descriptive statistics showed that the mean Falls Efficacy Scale score reduced from 11.07 ± 1.17 at baseline to 9.07 ± 1.01 at post-intervention after 4 weeks of treatment using Wilcoxon signed test indicating decreased fear of falls. The statistical significance was 0.001 and the percentage of change is -18.1% with effect size 1. While the Lawton–Brody IADL score improved from 4.57 ± 1.50 to 5.10 ± 1.40, reflecting better functional independence. Shapiro–Wilk tests revealed non-normality of paired differences so Wilcoxon signed-rank tests were applied and the statistical significance was 0.001 with percentage of change was +11.6% and had large effect size of -1.
The graph is a representation of mean differences of pre and post intervention scores of Falls Efficacy Scale and Lawton Broady Scale. The mean value for pre- Falls Efficacy Scale is 11.07 and post is 9.07 whereas for Lawton Broady Scale pre value is 4.57 and post is 5.1 which shows significant decrease in fall and increase in activities due to reduce fall rate.

Table 1: Comparison of pre-intervention and post-intervention scores of Falls Efficacy Scale

	Mean	Median	SD	SE	w	p	r	%change
Falls efficacy scale pre	11.07	11	1.17	0.214	0.823	<0.001	1	-18.1%
Falls efficacy scale post	9.07	9	1.01	0.185				

Table 2: Comparison of pre-intervention and post-intervention scores of Lawton Broady Scale

	Mean	Median	SD	SE	w	p	r	%change
Lawton broady scale pre	4.57	4	1.5	0.274	0.637	<0.001	-1.00	+11.6%
Lawton broady scale post	5.1	5	1.4	0.255				



Graph 1: Visual representation of outcome of the scores for both the scales

Discussion

The participant included were with an average age of 71.2 ± 3.49.

The term "fear of falling" (FOF) refers to a fearful response to standing or walking, as well as reduced balance with decrease in self-efficacy, and/or a detrimental avoidance of activity bought on from FOF. When someone experiences a fall at home, it often makes them fearful of doing even simple activities around the house. This fear usually leads to a big reduction in physical activity, which then causes their physical abilities to decline further and reduces their confidence in carrying out daily tasks (ADLs). Since falls and the avoidance of daily activities are closely linked, this has important implications for fall-prevention programs. Interventions should therefore aim at keeping older adults more active and helping them feel safe while performing their everyday activities. Personalized physical activity programs, especially those that focus on function, can break the cycle of frailty. By improving strength, balance, and overall physical control, the chances of serious or unnecessary falls can be reduced. Simple training in basic abilities like balance and muscle strength not only improves physical resilience but also helps older adults regain self-esteem and confidence in their ability to stay active [22].

A study done by Monteiro *et al* on relationship between fear of falling and balance factors in healthy women concluded that elders with higher muscle strength have better balance which is related to lower risk of fall. While the strength of the core muscle and lower extremity were not measured independently, the isometric nature of the egoscue exercise can be contributing factor for improving the abdominal and lower limb muscle strength [23].

The physiology of these exercises is similar to the isometric exercise. The isometric holds in the exercise helps in improving the stability of the joints and strength in the muscles especially in the spine, core muscles and lower limb musculature. A study done by Filipe Rodrigues *et al* on the effects of muscle strength, agility and fear of falling on risk of falling on older adults stated that improving muscle strength in elderly might decrease fear leading to lower risk of falling. Due to this strengthening effect, we can suggest that it's contribution in increasing stability of the spine leads to reduced risk of fall [24].

A study by Nyeon-Jun Kim *et al*. on the effects of isometric trunk exercises and dynamic trunk exercise on gait in elderly people concluded that the isometric trunk exercise contributes in increasing the lower extremity strength that helps for better balance and ability to walk [25]. A study by Daniel XM Wang *et al*. in his study about muscle mass, strength, and physical performance predicting activities of daily living in a meta-analysis concluded by saying that the muscle measures are of utmost important for predictors of ADL and IADL [26]. This suggests that with increase in muscle strength, there could be an increase in the self-sufficiency of the elderly people. This will cause an automatic increase in the daily functionality of the elderly age group.

These findings resonate with our study, as the potential mechanism can be linked to the improvement in posture and correction of spinal alignment. This corrective alignment further facilitates efficient movement patterns, promotes better core stability, and may contribute to the increase strength in lower limb and helps reducing fall and increase in daily functionality.

In summary, Egoscue leverages isometric principles to build the foundational strength and stability necessary for correcting posture and improving overall bodily function.

Conclusion

The present study concludes that the egoscue exercises for 3 times in a week for 4 weeks for 45 minutes per session has proved to be effective in reducing fear of fall and improving instrumental activities of daily living in community dwelling elders.

Acknowledgement

Funding Body: None.

Ethical Approval: Approved R&D/2025/47.

Conflict of Interest: No conflict of interest.

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