Correlation of static and dynamic balance with fear of falls in institutionalised elderly: A cross sectional study

Dr. Parag Ranade (PT)
Ph.D.Scholar at College of Physiotherapy, Sumandeep Vidyapeeth Deemed to be Universty, Piparia, Vadodara, Gujarat State, India
Corresponding author email: paragranade1@gmail.com

Dr. Nalina Gupta
Professor College of Physiotherapy, Sumandeep Vidyapeeth Deemed to be Universty, Piparia, Vadodara, Gujarat State, India

Dr Sandesh Sakpal (PT)
Asst.Professor, K.J. Somaiya College of Physiotherapy, Mumbai, Maharashtra, India

Abstract---Background:- Fear of Falling (FoF) is described as a disproportionate fear of falling or the notion that one cannot avoid falling. To remain physically active, you must maintain your balancing function. Fear of falling is one of the leading causes of actual falls among the elderly, according to previous research. In hospitalized aged people, falls and starts falling injuries are more prevalent than in community-dwelling seniors. It is an established fact that with age the person's ability to maintain balance reduces and along with FoF further restricts mobility and movement. Hence finding correlation among them is important, because no exact correlation has been done between the two. Methodology – The research was carried out in Pune, India. The approach of easy sampling was used to choose 90 samples. Individuals above the age of 60 were chosen based on selected studies. The Falls Efficacy Scale-International was used to quantify fear of falling, while FICSIT-4 and TUG were used to record stationary and non - stationary balance. Results - The data was therefore correlated using Pearson's correlation coefficient after passing the Normality test. In institutionalised old people, there was a slight positive link between FoF and dynamical balance and a large negative relationship between FoF with static balance. (r value is 0.35 & -0.81 respectively). Conclusion - The study has shown a strong negative co-relation between static balance and FoF and a weak positive correlation between dynamic balance and FoF institutionalised elderly.This is because dynamic balance requires more body systems

to gain control as against static balance. Hence, such people can be readily identified in main care and once recognized; it can be given balance improvement strategies thereby reducing their FoF and improving mobility, social integration etc.

Keywords---institutionalised elderly, fear of falls, static, dynamic balance.

Introduction

In India, the elderly population has been steadily expanding over time. The elderly population is suffering from various health issues, the most prevalent of which are falls, which result in damage, trauma, reliance, and, in some cases, death in a significant portion of the population [1] [2]. Falls and fall-related injuries are more common among institutionalised older people than among community-dwelling older people [3]. Ageing is a dynamic, progressive, and physiological process that includes function, morphology, biochemistry, and psychological changes. India, the world's second-most populous nation, has experienced significant growth in the number of senior people, which is expected to reach 324 million by 2050 [4]. Fear of falling (FOF) is a serious health concern among the elderly living in communities, affecting those who have lost and never failed. Around 30–55 percent of older people admit to being terrified of falling, and around a third of them say they limit their activities. FOF is now recognised as a distinct health issue among the elderly. The frequency of FOF has been observed to range from 3 to 85 per cent [5]. FOF is found in 21 to 85 percent of community-dwelling older persons who have fallen before and 33 to 46 percent of older adults who have not decreased [6].

Fear of falling is a common issue among older persons, and it may cause them to avoid things that they are still capable of [7]. FOF causes people to avoid activities and lose fitness, and it's a risk factor for future falls and death, dysfunction, and premature nursing home admissions. FOF and avoidance of activities might lead to social isolation and inactivity. 8 FOF may represent a realistic assessment of diminished functional skills, which can lead to a cycle of activity avoidance due to a lack of confidence, deconditioning, and postural instability, which can increase the risk of falling [9]. [10]. FOF has been established as a risk factor for lower quality of life, activity limitation, loss of independence, and the risk of falling and the main cause of injury, morbidity, and death [11]. The dynamic process through which the body's postures are kept in equilibrium is balanced. It is critical to keep your credit to be physically active throughout your life. Balance is commonly disturbed in the elderly due to ageing processes, illnesses, and inactivity [12]. Ageing is linked to a loss of equilibrium. Balance is aided by various sensory systems, including sensory input from the feet and ankles, ocular input, and vestibular input [13]. However, many of these systems deteriorate as people become older. Substantial morbidity, death, functional decline, hospitalisation, institutionalisation, and health and social service expenditures are significant consequences of falls [14].

Review of Literature

In some older persons, perceptual and impartial fall risks (e.g., performance on a balancing test). Delbaere et al. [23] drew attention to this discrepancy in a group of community-dwelling older individuals. For fall prevention and therapy, it's critical to align risky fall behaviour with physiologic fall risk. For example, challenging balancing exercises in adults with a high perceived risk of falling but a low physiological risk may exacerbate fears of losing and impair training involvement. On the other hand, approaches targeted at enhancing self-efficacy and fall management may be advantageous for persons who have a higher physiological risk of falling. Still, they are less likely to succeed than those who do not self-perceived an increased risk of losing. It's also unclear if and how cannabis usage affects the association between positive and physiological fall risk. This is an essential issue to research because cannabis, particularly THC-dominant strains, may change cognition (as noted above) and lead to a mismatch between perceived and neurobiological fall risk.

In recent research, we found that older cannabis users had a greater risk of falling than older non-users [24]. However, this study did not look at whether changes in perceptual or physiological risk may help explain this result. This pilot research aimed to provide the results of a follow-up analysis of this dataset [20] to look into any differences between perceived and physiological fall risk in elder cannabis users. It was predicted that older cannabis users would have a lower perception of fall risk and a greater physiological fall risk than non-users, demonstrating a disconnect between the two notions in the users' group. The conclusion is that elderly cannabis users who have an abnormally low fear of falling may take excessive balancing risks exceeding their physical ability, perhaps causing injury. A recent meta-analysis found that greater THC dosages were linked to increased rates of thinking and perceptual problem symptoms in persons under the age of 50 [25]. When combined with the current data, these meta-results might imply that certain types of cannabis have a negative impact on perceptual balancing understanding; however, additional study on whether cannabis modifies perception is necessary to corroborate such a conclusion. Nonetheless, rather than concentrating exclusively on improving balance, intervention programmes should assist older users in establishing a more accurate assessment of their fall risk or increasing physical functioning in tandem with anxiety reduction.

Despite differing BBS-14 scores, there was no difference in outcomes in static posturography measurements. It's conceivable that the Users had a persistent physiologic fall risk that the posturography evaluation missed or used stiffening' compensating methods (e.g., antagonist muscle co-contraction) to reduce the chance of falling during the balancing test [26]. Furthermore, a quiet stance with eyes wide open might not be a satisfactorily hard thing to illustrate distinctions, and more complex situations, such as eyes closed and narrower bases of assistance, or more intelligent COP analyses (e.g., entropy-based indicators) [27], may have better characterised the groups. Moreover, diminished leg muscular strength, which had not been assessed in this research, might have harmed dynamic balance by decreasing their ability to create stabilising forces and moments at the ankles, knee, as well as hip joints, particularly in the problematic

BBS-14 condition. It's also worth mentioning that some of the things are scored subjectively by the BBS. BBS-14, on the other hand, has defined objective cut-offs for each rating and is unable to be swayed by investigator interpretations. The limited number of respondents and the range of cannabis products used by the Individuals that may have obscured specific variances were two major flaws in this pilot research, both of which call for care in interpreting the findings. Still, one goal of pilot research is to estimate impact sizes for more significant studies. Thus the effect sizes in Tables 2 and 3 may be utilised for additional power research. Post-hoc power studies revealed that the static suggests that solid and ABC-1 outcomes had a power of 5–17 per cent, whereas BBS-14 had a capacity of 92 per cent. This indicates that either:

1. Some of these studies were performed.
2. Several of the data came from two identical distributions.
3. Most of these measures aren't sensitive enough to identify group differences.

Given the similar demographic traits and the probable lack of differentiating ability of linear COP metrics like pathlength and compare [27], a combination of ideas 2 and 3 seems to be the most plausible. Other sensitivity, particular, and reliable measurements of fear of falling and non-linear measures may be helpful in future investigations [27].

The falling efficacy scale internationally (FES-I), for example, is an independent framework that measures a person's perceived risk of falling [28]. This scale, like the ABC, asks individuals to score their fear of falling throughout a variety of everyday tasks, and it covers other, and perhaps more meaningful, abilities. A lack of an overt cognitive evaluation [29] for research enrollment was another possible constraint. We are convinced that the absence of overt cognition assessment (e.g., through MoCA) had no detrimental effect on the outcomes since our volunteers were neighbourhood (many still employed) and competent to grasp the research methodology. In addition, seven participants with chronic pain and one person with Parkinson's disease were included in the medical grounds for cannabis usage, which might have influenced the findings considerably. As a result, an exploratory analysis was conducted without the Parkinson's disease participant, which demonstrated that this exclusion did not affect the published results. Future research might benefit from examining the products and linkages of anxiety on balance ability in each balance testing technique by questioning anxiety levels (e.g., using a visual analogue scale). Several cognitive categories, such as depressive episodes [30], psychoticism [31], and concentration and executive function [32], have also been associated with falling or fear of losing. Data collection and analysis

Numerous strategies might help researchers better understand the links between perceptual and physiological fall prevention. These measures are crucial since the various THC: CBD ratios may have a significant and unique influence on these effects and moderate perceptive and physiologically fall risk. However, future studies might benefit from additional objective measurements of physical fall risk (e.g., gait assessment, more severe posturography circumstances, muscular strength testing). More research into the links between fear of falling and reduced/limited physical activity, which leads to a decline in postural control

ability, is also recommended. Finally, there is a lack of knowledge on the impact of various THC: CBD ratios on the risk of falls and other relevant issues. Older individuals may unwittingly use cannabidiol products that enhance their physiologically fall risk and alter their perceived risk if they lack this information. Falls in these individuals may become more common, significantly impacting their standard of living and ability to accomplish daily tasks.

Need of the Study

Despite the fact that FOF is recognised as having both psychological repercussions, few research have looked into it. FOF is widespread in senior people, according to several research, and is linked to worse quality of life, greater frailty, and unfavourable effects such as fewer daily activities. Moreover it is an established fact that with age the person's ability to maintain balance reduces because the body sway increases. Hence it is important to study the changes which occur in balance with aging. This along with FOF can further restrict the mobility and movement of the individual. Reduced equilibrium and loss of postural control are the most prevalent problems among the elderly, which affect the possibility of falls and instabilities when walking [11]. As balance maintenance is considered as most important indices for determining elderly people's independence. This will limit mobility, reduce physical activity and further contribute to falls. It has been suggested that worry and increased risk of falls have a direct detrimental impact on balance. However there is no correlation amongst balance and FOF established and hence the need.

Aim

To find out Correlation Of Static And Dynamic Balance With Fear Of Falls In Institutionlised elderly

Objectives

To assess the fear of falls using the Falls Efficacy Scale (FES-I).
To assess the static balance by using FICSIT 4
To access the dynamic balance by using TUG Scale.
To find out the relationship of static and dynamic balance with fear of falls in institutionalised elderly individuals.

Methodology

Study design : observational cross section study
Study Area & duration : Pune , 6 months
Study individuals : Individuals above 60 years of age
Types of sampling : convenient sampling
Sample size :   90 (formula used : $n=z^2pq/d^2$) Sample size was determined based on prior estimates (prior study)[15] of mean score of these two variables BMI and Fear of falls in elderly. Sample size was calculated taking considering type I error(α) = 0.05, Type II error(β) = 20%. i. e power of the test=80%, confidence interval = 95%. Sample size was calculated as 90.
Outcome Measure : FICSIT 4 & TUG and FES-I.

Inclusion Criteria

Participants who are aged 60 years   and more.Both males and females. Understanding English or Hindi language .MMSE score more than 24.Able to walk with or without assistive devices. BBS score more than 21

Exclusion Criteria

History of falls within past 6 months. Having any Cognitive disorder. Undergone any recent surgery.Having any musculoskeletal or neurological disorder. Having uncorrected visual disturbances.

Results

This study was done to determine the correlation of static and dynamic balance with Fear Of Falls in community dwelling elderly. Total 90 elderly participated in this study. Out of which 49 were females and 41 were males.

Table 1: Descriptive Statistics of Age, Static & Dynamic Balance and Fear of falls score

|	Age (years)	Static balance	Dynamic balance	FES Score	
Mean & SD	70.3± 4.4	21.6 ± 3	15.54±4.32	38.5±10	

The data was found to be normal. The two variables were compared using Pearson's Correlation Coefficient. Correlation coefficient (r) = 0.35, P value = 0.01 using Pearson's correlation test (statistically significant). The findings reveal a modest positive relationship between delicate equilibrium and older people's fear of falling.
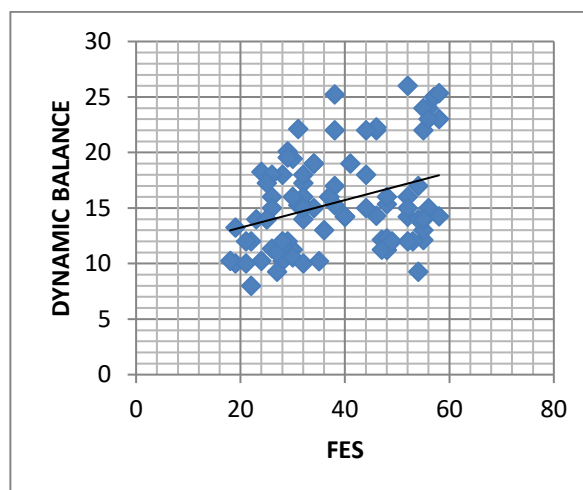
Graph 1 : Correlation between Dynamic balance with FES

The data was found to be normal. The two variables were compared using Pearson's Correlation Coefficient.

Correlation coefficient (r) = -0.81 using Pearson's correlation test. 0.01 p-value (statistically significant). The results demonstrate a strong negative relationship between static balance (FICSIT 4) and older people's fear of falling.
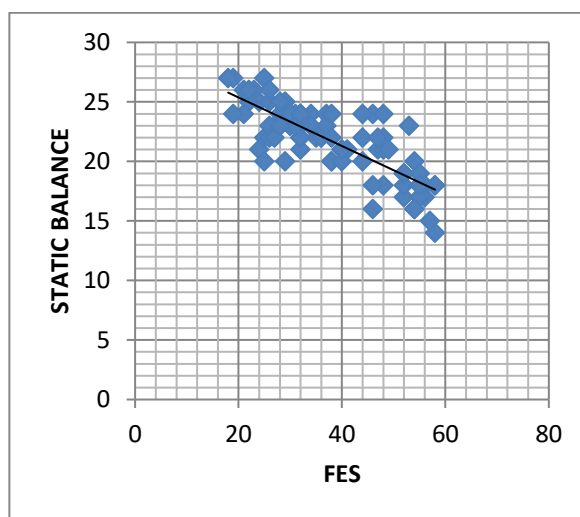
Graph 2 : Correlation between Static balance with FES

Discussion

In institutionalised living old, there is a slight positive link between FoF and dynamic balance and a substantial negative correlation between FoF with static balance, according to the findings of this research. (r = 0.35 and -0.81, respectively). Our findings show that worry and fear of falling have a direct detrimental impact on balance. The capacity to retain a body's line of gravity within a stable base of support with minimum wobble is referred to as balance. Perception of one's bodily position and movement in space necessitates a combination of data from peripheral receptors in several sensory systems, including the visual, somatosensory, and vestibular systems [12].

Fear of falling is thought to predict falls because it causes activity avoidance, which leads to deconditioning, which raises the chance of falling. It's linked to poor physical and mental health, and it may be debilitating, particularly if it restricts exercise. Physical function decrease is predicted by activity limitation linked with a fear of falling in the aged population [15]. Thomas et. al [17] observed that situational anxiety linked to postural threat impacts balance parameters and dual tasking performance in a research on the association between fear of falling and balance and dual tasking performance. Our study showed different correlation for static and dynamic balance which in accordance with study conducted by M.T.karimi and S.Solomonidis et.al [18] concluded in study that there was no correlation between static and dynamic balance stability parameter in quiet standing and performing various task.

The study's poor association might be attributed to other variables linked to Fear of Falls. Fear of falling has strong links to general health, vision impairment, mobility impairment, stroke, hypertension, balance impairment, medicines, previous falls, and daily activities. Balance impairment, illiteracy, female gender, and poor perception were all related with fear of falling in the multivariate analysis. Those with balance impairment were more than three times as likely to have a fear of falling as those without balance impairment [19]. unable to rise from a knee-height chair, lower household income, using a walking aid, difficulty using public transportation, poorer physical health, minority ethnic group, self-reported balance problems, lower educational level, and a higher BMI were among the factors associated with FOF among community-dwelling older people, according to Arun Kumar, Hannah Carpenter, and colleagues 20. A key risk factor for falls and fear of falling is a loss of balance. Furthermore, balance is an important part of most daily activities for older adults [21]. Another research found that FOF is highly linked to past falls, as shown by "post fall syndrome" [22]. As a result, this study excluded participants with any history of falls, which might explain the limited positive connection between them (33).

Conclusion

Weak positive correlation between FoF and dynamic balance and strong negative correlation between FoF and static balance in institutionalised dwelling elderly. (r value 0.35 & -0.81 respectively).

Limitation of Research

The other confounding factors were not considered such as gender, BMI, depression, environment, cognitive impairement etc. Individuals who are already fallen are not consider & individuals with severely impaired balance are not taken.

Clinical Implications

It is an established fact that with age the person's ability to maintain balance reduces and along with FoF further restricts mobility and movement. So early fall prevention intervention for postural control would reduce the fear of fall thus, Hence, such people can be readily identified in primary care and once identified; they can be given balance improvement strategies thereby reducing their FoF and improving mobility, social integration etc. Falls prevention strategies that have been found to minimise both falls risk and FOF may help these persons. Identifying main risk factors for fear of being caught may assist health care providers in designing a screening programme and may also be effective in developing multidimensional strategies that concentrate on increasing balance, literacy, daily living activities, and health perception..

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