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Comparison of Fear of fall, Mobility and Balance among older people with and without Diabetes Mellitus - An Observational study

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ABSTRACT

Background: The prevalence of diabetes increasing rapidly worldwide, especially in low- and middle-income countries. Diabetes mellitus can lead to so many other complications. This study has been conducted to find out fear of fall in diabetic elderly.
Objectives: This study was designed to find out fear of fall in older people with Diabetes Mellitus
Methods: An observational study on 200 males and females, who were aged more than 60 years, included by purposive sampling method, from which 100 were diabetics and 100 were nondiabetics was conducted in community of Ahmedabad. Fall Efficacy Scale International (FES-I), Timed Up and Go (TUG) test and sharpened Romberg test were taken to assess to assess fear of fall, mobility, and balance respectively. Both groups were compared using Mann Whitney U test. Level of significance was kept at 5%.
Results: Results showed statistically significant difference in fear of fall on FES-I scale (p=0.03) and mobility on TUG scale (p=0.043) between both groups. But there was no statistically significant difference in balance on sharpened Romberg test (p=0.158)
Conclusion: This study concluded that, there is more fear of fall as well as reduced mobility in diabetic elderly as compared with non-diabetic elderly. But no difference in balance was seen.
Keywords: Fear of fall, Diabetes Mellitus, older people.

INTRODUCTION

"Fall is defined as an unintentional loss of balance that leads to failure of postural stability or sudden and unexpected change in position which usually results in landing on the floor (Alghwiri & Whitney, 2011, Balance and Falls, in Geriatric Physical Therapy [3rd ed.], pp. 331–353)."[1] Increasing age is found to be associated with increased falls, (Ying Li,2023)".[3]"Type 2 diabetes is associated with balance & gait abnormality and an increased risk of falls and injuries. Possible diabetes associated risk factors for falls include neuropathy, polypharmacy, cognitive impairment, peripheral arterial disease, vision loss, hypoglycemia & insulin therapy. Elderly individuals who have experienced one or more falls may develop fear of falling which leads to a loss of confidence in a person's ability to perform routine tasks, restricted activities, social isolation, functional decline, depression, and decreased quality of life. (Howland J,1993)".[4] The fear of falling arises more often from a person's fear of institutionalization than a fear of injury (Pradeepa R & Mohan V,2021) [5]

"According to WHO, the prevalence of diabetes is growing most rapidly in low and middle - income countries (Pradeepa R & Mohan V,2021)"[5]. In diabetic elderly due to involvement of sensory nervous system and due to multiple medications, it may lead to more incidence of fall and cause fear of fall. So, there is a need to see whether diabetes mellitus is associated with fear of fall or not.

The primary objective of the study was to find out fear of fall in elderly people with diabetes mellitus and compare it with older people without diabetes. Secondary objectives were to compare balance and mobility in elderly people with and without diabetes mellitus.

Materials and methods:

Ethical clearance was obtained from Sangini hospital ethical committee Ahmedabad as part of a bigger project. An observational study was conducted on 200 participants from the community of Ahmedabad, Gujarat, India. They were selected using purposive sampling technique, from which 100 were diabetics and 100 were non diabetics. The sample size calculation was done by following equation:

$$Z\ 1\text{-}\alpha\ /2\ 2p(1-p)/d2$$

where, Z 1-α /2 = standard normal variate (at 5% type 1 error ($P<0.05$) it is 1.96, p = Expected proportion in population based on previous study (here it is 0.1545) and d = Absolute error or precision (here, 5%) [6]

The participants were explained the study and written informed consent was obtained. Inclusion criteria were age > 60 years, participants willing to participate, both male and female. There were two groups, one had people with diabetes, and the other had people without diabetes. For diabetic group participant should be diagnosed with type 2 diabetes since at least 6 months or more. The exclusion criteria were recent lower limb injuries or fractures, hypotension Systolic Blood Pressure (SBP)< 90 mmHg, Diastolic Blood Pressure (DBP) <60 mmHg, recent angina/ MI, vertigo, visual or hearing difficulties, uncontrolled hypertension DBP>100 mmHg, recent major surgery within 6 weeks, uncontrolled diabetes mellitus (HbA1c>8).

Demographic data like age, gender, duration of diabetes, any other medical disease, history of any major surgery in previous year, HBA1c (glycated hemoglobin) value, Random Blood Sugar value (RBS), medications taken for diabetes, history of fall in previous year, any assistive device if used were taken.

Fall Efficacy Scale International, Timed Up and Go test and sharpened Romberg Test were taken in both diabetic and non-diabetic group.

Fall Efficacy Scale International (FES I) is a questionnaire used to find out fear of fall. It contains 16 items which have scoring from 1 to 4, regarding the patient's concern of falling while doing the activity. The higher score shows more fear of fall. The total score is ranging from 16 to 64. FES-I has excellent internal consistency (Cronbach alpha - 0.96) and test-retest reliability (0.96) [7]

Timed Up and Go test measures time required to stand from a chair and walk for 3 meters, turn and come back to the chair. [8]

Sharpened Romberg Test also known as tandem Romberg, requires the patient to stand with the feet in a heel to toe position with arms folded across the chest. First the person was assessed with eyes open then with eyes closed. The time with eyes closed before the sway was noted.[9]

Statistical analysis was done using IBM SPSS v. 23. In statistical analysis, as the data were not normally distributed in both the group, between group analysis was done by using Mann Whitney U test.

Results:

There was total 200 participants, from which 100 were diabetics and 100 were non diabetics. Prevalence of fear of fall in both groups is shown in fig 1. Mean values of outcome measures are shown in table 1. Gender distribution is shown in table 2. In between group analysis there was significant difference ($p<0.05$) between the groups for FES-I and TUG, but for sharpened Romberg test there was no significant difference between the groups. (table 3)

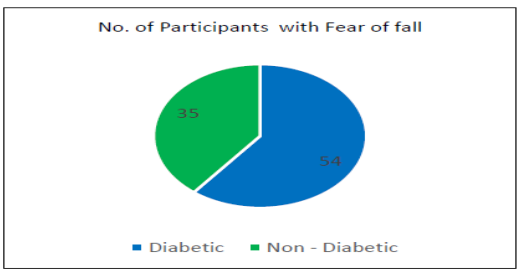

Figure 1: Number of participants having fear of fall in each group

Table 1: Baseline data of both the groups

Outcome measure	Diabetic group (group A) Mean ± SD	Non diabetic group (group B) Mean ± SD
Age (years)	72.04±7.35	70.48±6.96
FES-I	24.75±5.53	23.13±7.04
SRT	30.40±13.26	33.82±1.79
TUG	14.42 ± 3.51	14.96±12.58

FES-I =Fall Efficacy Scale International, SRT=sharpened Romberg Test, TUG=timed up and Go test, SD=standard deviation

Table 2: Gender distribution in each group

Group	No. of Male	No. of Female
Diabetic	48	52
Non diabetic	43	57

Table 3: Between group analysis Mann-Whitney test

Outcome measure	Mann-Whitney (U) test	Significance (p value)
FES I	3791	0.03
SRT	4331.5	0.16
TUG	4170.5	0.04

FESI= fall efficacy scale international, SRT= sharpened Romberg Test
TUG=timed up and go test,
p value= significance value, if $p < 0.05$, the result is considered statistically significant.

DISCUSSION:

The present observational study demonstrates that older adults with type 2 diabetes mellitus (T2DM) exhibit a significantly greater fear of falling on FESI compared to their nondiabetic counterparts. Additionally, mobility limitations on TUG, were more pronounced in the diabetic group, although no significant differences were observed between groups in the Sharpened Romberg Test outcomes.

Our findings are supported by David Bruce et al. [2], who investigated fear of falling in 186 diabetic and 186 normoglycemic individuals. They found that fear of falling and fear-associated activity restriction were more prevalent among individuals with type 2 diabetes. Their study highlights that while such activity restriction might offer short-term protection against falls, it ultimately contributes to functional decline and increased fall risk in the long term—an outcome that mirrors the reduced mobility observed in our diabetic participants.

Similarly, Stefano Volpato et al. [10] identified significant risk factors for falls among 878 elderly diabetic women, including lower extremity pain, poor lower extremity performance, and high body mass index. These physiological impairments likely contribute to mobility limitations and a heightened sense of instability, further fueling fear of falling.

Although we did not assess the specific factors contributing to fear of falling in our sample, prior literature suggests that postural sway, polypharmacy, and diabetes-related comorbidities (e.g., hypertension, coronary artery disease) may play a significant role [5], [10], [11]. In our study, many participants in both groups reported comorbid conditions such as hypertension, hypothyroidism, degenerative knee changes, chronic back pain, history of knee replacement, and coronary artery bypass grafting. However, these comorbidities were not analyzed separately, representing a limitation of our study.

Conclusion:

This study concluded that, there is greater presence of fear of fall in diabetic participants. They also have reduced mobility compared to age matched individuals with similar balance.

Clinical Implication:

Fear of fall in diabetic elderly should be considered with equal emphasis on mobility and function while prescribing exercises.

Future Recommendation:

Study to see the effect of exercise on balance, mobility, and fear of fall in diabetic elderly can be done.

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