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Effects of Therapeutic Exercises on Balance among Rural Elderly Individuals with Type 2 Diabetes Mellitus

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Abstract: ***Background: Rural residents experience a 17% higher rate of type 2 diabetes than urban residents. Many of the counties in the diabetes belt have populations at high-risk of developing diabetes. Balance is the ability to collect sensory and proprioceptive signals related to a person's position in space and to produce the appropriate motor responses to control body movement. Balance disorders are one of the most important reasons to leading falls.The aim of this study was to assess the balance in elderly with type 2 diabetes mellitus, for improving balance and lowering falls risk in older adults with T2DM. Methods: Total 101 participants were participated in study. BBS scale were administered to assessed the balance in elderly individuals with type 2 diabetes mellitus, pre and post intervention of therapeutic exercises. Result:Result shown that the pre intervention BBS score were less than the post intervention BBS score which was statistically significant (<0.05). Unpaired student t- test and ANOVA test were used for statistical data analysis. Conclusion:The present study concluded that the after the one week intervention of therapeutic exercises on elderly individuals with type 2 diabetes mellitus improved balance and lowering the risk of fall in elderly individuals.***

Keywords: Therapeutic exercises, balance, elderly individuals, type 2 diabetes mellitus.

1. Introduction

Elderly population contributed to 7% of total population of India in 2001 and it will rise to 9% by 2016. In 2010,100 million people were aged above 60 years and by 2020 it will be 177 million. Ageing process is as such complex and multi-factorial. Chronic morbidities like diabetes and hypertension are becoming common health problems among the geriatric population.[1]Of all the diseases, type 2 diabetes mellitus (T2DM) is the single most disease affecting a large number of elderly populations along with Hypertension. Diabetes and its complications take a major toll on the quality of life of the elderly and the healthcare costs of the society. Diabetes further increases the risk of cardiovascular mortality in older people.[2]

Rural residents experience a 17% higher rate of type 2 diabetes than urban residents. Many of the counties in the diabetes belt have populations at high-risk of developing diabetes. Diabetes is an increased concern for rural communities than urban communities because of risk factors that are prevalent in rural communities and access to a variety of services.[3]There are many risk factors associated with diabetes. Having one or more risk factors increases the likelihood of developing diabetes. Common risk factors includes Obesity, Physical inactivity, Poor, diet, Older age, Family history, Race or ethnicity.[3]Rural elderly population have higher rates of the lifestyle habits that increase their likelihood of being obese and developing diabetes, such as consuming greater amounts of dietary fats and lesser amounts of fruits and vegetables. Rural communities often have populations that are at an increased risk of developing type 2 diabetes. At-risk groups include older adults and individuals of Alaskan Native, American Indian.[3]

Balance is the ability to collect sensory and proprioceptive signals related to a person's position in space and to produce the appropriate motor responses to control body movement. Balance disorders are one of the most important reasons to leading falls.[4]Considering that imbalance is often the primary cause of falls and disability, it is probable that older adults with diabetes could have greater balance problems. Balance control requires complex interactions among multiple systems of the body and encompasses different balance subtasks that could be affected by pathologies or aging differently.[5] Different types of balance abilities, such as moving the body's center of mass or changing the base of support repeatedly, are often required in daily living and are critical for functional independence.[5]

However, although numerous studies have shown the benefits of various balance programs in reducing falls risk and improving postural control in healthy older persons, few studies have been specifically designed to assess the impact of balance training for reducing falls risk in a population with diabetes. Several studies have reported that targeted interventions can reduce falls risk and/or improve balance and walking ability for older adults with T2DM.[6] Although regular physical activity has been shown to improve balance, reduce the risk of falls, and lead to a general increase in wellbeing.[6]

The aim of this study was to assess the balance in elderly with type 2 diabetes mellitus, for improving balance and lowering falls risk in older adults with T2DM.

2. Methodology

Aim

- To assess the balance in elderly individuals with type 2 diabetes mellitus.

- To improve the balance in elderly individuals with type 2 diabetes mellitus.

Study design: Interventional study design

Study setting: Rural community in Ahmednagar

Study duration: 3 months

Sample size: 110

Inclusion Criteria: All males and females above 60-year older age and elderly individuals with type 2 diabetes mellitus were included.

Exclusion Criteria: Elderly individuals with lower limb neuropathy and elderly who were using assistive devices, who were not willing to participated in study were excluded.

Ethical approval was obtained from the institutional ethical committee.

Data Analysis: Student t- test and ANOVA test were used for statistical analysis.

3. Procedure

Written informed consent form was taken from the participants for screening regarding participation in the study. Individuals with diagnosed type 2 diabetes mellitus was recruited from rural community, on the basis of their routine diabetes follow up. Demographic data of participants was taken. Berg balance scale was administered on individuals with type 2 diabetes mellitus on day one with demographic data. Berg balance scale is 14 item scale each item consisting of a five-point ordinal scale ranging from 0 to 4, with 0 indicating the lowest level of function and 4 the highest level of function and takes approximately 20 minutes to complete. Score of the scale was noted.

Therapeutic exercises were taught to the elderly individuals with type 2 diabetes mellitus on same day. Therapeutic exercises includes the following protocol.

Warm-up exercise:
- Stretching, step up and down on foam (10 min)

Balance exercise:
- Standing exercise on stable surface (4 min/set)

Heel and toe raises
- One-leg stance for each limb
- Toe walking

Standing exercises (10 min)
- Slowly sitting down and standing up on chair.
- Going up and down chairs
- Romberg exercises modifies eyes closed and open on hard / soft surface

Cool-down exercise (10 min)
- Deep breathing exercises,
- Abdominal breathing exercises,
- Static abdominals

These exercises taught to the individuals on day one and asked them to performed for the six days (one week). After one week individuals follow up was taken and also berg balance scale was administered and score was noted after the intervention.

4. Result

In this study 101 participants was participated out of 110, nine participants were not interested in participated in this study were excluded. The mean age was 68.5 Demographic data of the participants are depicted in table 1. Demographic data of the study participants (n-101). In demographic data socioeconomic status, height, weight, BMI, BSL level was taken. Berg balance scale score was taken before and after intervention. Before the intervention score was 40 and after intervention score increases i. e. 45 among elderly individuals which was statistically significant (p value=0.05) mentioned in table 2. Graph 1 represented the pre and post intervention score of berg balance scale.

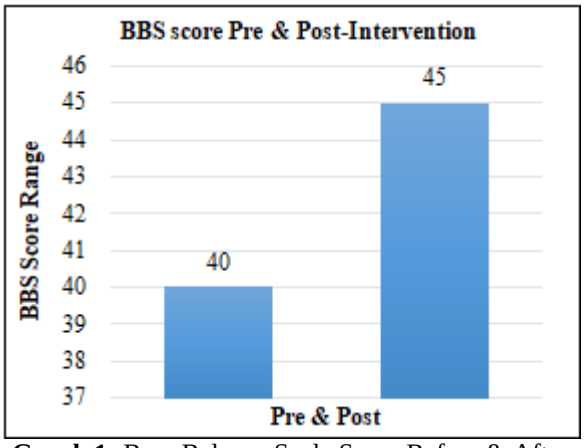
Table 1: Demographic data of study population (n=101)

Socioeconomic Characteristics	n= 101	Mean
Age		68.5
Gender Male Female	 n=41 n=60	
Socio-economic status	Grade IV	
BSL Level		226.99
Weight	-	60.2
Height (m)	-	F= 154.61 M= 162.40
BMI	-	F=26.92 M=24.2

Table 2: Berg Balance Score (Before & After intervention)

Berg Balance Scale	Pre-Intervention Score (mean)	Post-Intervention Score (mean)
	40	45

p value <0.05



Graph 1: Berg Balance Scale Score Before & After intervention.

5. Discussion

This present study found that the after the oneweek intervention of therapeutic exercises elderly with diabetes improved the balance and lowering risk of fall and it was statistically significant.Steven Morrison et al. assessed the 65 elderly individuals with type 2 diabetes mellitus. In this study supervised and unsupervised balance training was given to the participants for 12 weeks. Result of the study shown a significant lowering of falls risk ($P < .05$) and Overall, training led to a decrease in falls risk, lower limb proprioception, and general balance ability.[7]

Zahra Rojhani-Shirazi et. al. study performed on 60 elderly individuals with diabetes categorized randomly into three groups: an intervention group (N=20) that received ball training exercise, another intervention group (N=20) that received Frenkel exercise and a control group (N=20) that received no interventions. Exercise training session was performed for 3 weeks. Result of this study shown both types of therapeutic exercise programs significantly improved balance in single leg stance, star excursion test, and Berg balance scale test ($P<0.05$) compared to the control group.[8]

André Luiz Torres Pirauá et. al assessed the sixty four elderly individuals, Both Stable and unstable intervention groups received a core muscle, upper, and lower limb moderate-intensity strength exercises using stable and unstable surfaces. The classes were performed three times per week over a 24-week period.The primary outcome measures were the dynamic balance (Berg Balance Scale (BBS)) and functional mobility (timed up and go (TUG) test). The secondary outcomes included the sitting and rising test (SRT) and Falls Efficacy Scale—International (FESI) scores. Result shown that the there was a significant improvement in balance performance and Long-term ST with and without unstable devices was effective to improve dynamic balance in older adults.[9]

6. Conclusion

The present study concluded that the after the oneweek intervention of therapeutic exercises on elderly individuals with type 2 diabetes mellitus improved balance and lowering the risk of fall in elderly individuals.

7. Conflict of Interest

Authors has no conflict of interest.

Key Points

- Impairement of balance is very common in elderly individuals with disbetes mellitus and result in morbidity, loss of independence, and higher healthcare costs.
- Preventive strategies to reduce balance impairement and fall risk require identification of high risk patients

References

[1] Radhakrishnan S, Balamurugan S. Prevalence of diabetes and hypertension among geriatric population in a rural community of Tamilnadu. Indian journal of medical sciences. 2013 May 1;67.
[2] Jain A, Paranjape S. Prevalence of type 2 diabetes mellitus in elderly in a primary care facility: An ideal facility. Indian journal of endocrinology and metabolism. 2013 Oct;17(Suppl1):S318.
[3] 2002-2020 Rural health information Hub.
[4] Değer TB, Saraç ZF, Savaş ES, Akçiçek SF. The relationship of balance disorders with falling, the effect of health problems, and social life on postural balance in the elderly living in a district in Turkey. Geriatrics. 2019 Jun;4(2):37.
[5] Tsai YJ, Yang YC, Lu FH, Lee PY, Lee IT, Lin SI. Functional balance and its determinants in older people with diabetes. PloS one. 2016 Jul 28;11(7):e0159339.
[6] Morrison S, Simmons R, Colberg SR, Parson HK, Vinik AI. Supervised balance training and Wii Fit–Based exercises lower falls risk in older adults with type 2 diabetes. Journal of the American Medical Directors Association. 2018 Feb 1;19(2):185-e7.
[7] Morrison S, Simmons R, Colberg SR, Parson HK, Vinik AI. Supervised balance training and Wii Fit–Based exercises lower falls risk in older adults with type 2 diabetes. Journal of the American Medical Directors Association. 2018 Feb 1;19(2):185-e7.
[8] Rojhani-Shirazi Z, Barzintaj F, Salimifard MR. Comparison the effects of two types of therapeutic exercises Frenkele vs. Swiss ball on the clinical balance measures in patients with type II diabetic neuropathy. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2017 Nov 1;11:S29-32.
[9] Pirauá AL, Cavalcante BR, de Oliveira VM, Beltrão NB, de Amorim Batista G, Pitangui AC, Behm D, de Araújo RC. Effect of 24-week strength training on unstable surfaces on mobility, balance, and concern about falling in older adults. Scandinavian journal of medicine & science in sports. 2019 Nov;29(11):1805-12.
[10] Alexandre TS., Meira DM., Rico NC., Mizuta SK. 2012. Accuracy of Timed Up and Go Test for screening risk of falls among community-dwelling elderly. *Brazilian Journal of Physical Therapy*. Oct;16(5):381-8.
[11] Bonder BR, Dal Bello-Haas V. Functional performance in older adults. FA Davis; 2017 Dec 4
[12] Bongue B., Dupré C., Beauchet O., Rossat A., Fantino B., Colvez A. 2011. A screening tool with five risk factors was developed for fall-risk prediction in community-dwelling elderly. *Journal of clinical epidemiology*. Oct 1;64(10):1152-60.
[13] de Oliveira PP., Fachin SM., Tozatti J., Ferreira MC., Marinheiro LP. 2012. Comparative analysis of risk for falls in patients with and without type 2 diabetes mellitus. Revista da AssociaçãoMédicaBrasileira (English Edition). Mar 1;58(2):234-9.
[14] McArdle WD, Katch FI, Katch VL. Exercise physiology: nutrition, energy, and human performance. Lippincott Williams & Wilkins; 2010.

[15] Chen CC, Liu K, Hsu CC, Chang HY, Chung HC, Liu JS, Liu YH, Tsai TL, Liaw WJ, Lin IC, Wu HW. Healthy lifestyle and normal waist circumference are associated with a lower 5-year risk of type 2 diabetes in middle-aged and elderly individuals: Results from the healthy aging longitudinal study in Taiwan (HALST). Medicine. 2017 Feb;96(6).
[16] Chiba Y, Kimbara Y, Kodera R, Tsuboi Y, Sato K, Tamura Y, Mori S, Ito H, Araki A. Risk factors associated with falls in elderly patients with type 2 diabetes. Journal of Diabetes and its Complications. 2015 Sep 1;29(7):898-902.
[17] Gale CR, Westbury LD, Cooper C, Dennison EM. Risk factors for incident falls in older men and women: the English longitudinal study of ageing. BMC geriatrics. 2018 Dec 1;18(1):117.