

Effects of Resistance Exercise with Theraband in Fall reduction in type 2 Diabetes mellitus.

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Abstract

Falls are a serious health concern among older populations. Similarly, Type 2 diabetes, a chronic disabling disease is highly prevalent among older individuals. Objective: To analyse whether Resistance training given with Therabands are effective to prevent falls. DESIGN: The study design was pre - test, post – test experimental study design. METHOD: Purposive sampling was used. 80 subjected were selected & treated with Resistance Exercises with Theraband. TOOLS USED: Timed up & go Test to assess Fall Risk RESULTS: Statistical analysis done by using paired t- test showed there is significant reduction in Fall risk. CONCLUSION: Results from this study shows that Resistance training given with Therabands are effective to prevent falls in Type 2 diabetic patients

1. Introduction

Falls are serious health concern among older populations. Similarly, Type 2 diabetes, a chronic disabling disease is highly prevalent among older individuals. Efforts to reduce the prevalence of falls among the elderly constitute an enormous public health challenge. Type 2 diabetes, has 2.5 fold increased risk of incurring an injury as a result of fall as well as having a higher fracture risk. Since it poses a major threat to an older person's life quality, falls prevention plan, and to periodically screen them for any physiological changes that can heighten falls risk becomes mandatory.

NEED FOR THE STUDY:

Tailored programs that focus on systematic medication reviews, a falls risk assessment including balance, gait, and strength tests, as well as tests of cognitive

functioning, followed by balance exercises, general exercise programs, including cardiovascular fitness and resistance training of adequate intensity and duration and cognitive training have also been proposed to be efficacious

Rashmi Supriya et al (2021) in their study 'Effect of Exercise on secondary sarcopenia :A comprehensive Literature Review showed the need for Different types of exercise to be explored for patients with sarcopenia and specific comorbidities⁵ Studies done with Thera band has not focused on Fall Prevention in Type 2 Diabetes mellitus.

Hence the purpose of the study is to explore its effects in preventing falls.

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OBJECTIVES OF THE STUDY

To analyse whether Resistance training given with Therabands are effective to prevent falls .

INCLUSION CRITERIA

- Males & females.
- Age above 50 Years
- Type 2 Diabetic Patients
- Medium risk & High risk category in Fall risk Assessment Tool ⁹

EXCLUSION CRITERIA

- Age below 50 Years
- Type 1 Diabetic Patients
- Amputation of upper & lower limb
- Sensory loss in lower limb
- Low risk category in Fall risk Assessment Tool

2. Methodology

Resistance training with thera bands are given to selected patients

RESISTANCE TRAINING:

1.Biceps curls⁴

Patient is instructed to sit on backrest chair without arms with foot touching the ground. Using red coloured band placed below both feet & both arms holding either side of band, instructed to pull band from extended elbow to flexed elbow. A minimum resistance is set initially for 2 weeks & then gradually increased by 40-50%

2.Triceps extension ⁴

Patient is instructed to sit on backrest chair without arms with foot touching the ground in front of a door or window grill so that band is inside thro the grill & each end is held by each hand with both arms flexed pull the band down with elbow in extension. A

minimum resistance is set initially for 2 weeks & then gradually increased by 40-50%

3.Trunk Side bends⁴

Patient is instructed to sit on backrest chair without arms with foot touching the ground, band is held by one arm in shoulder elevated position with arm facing ceiling & other end of band is held

in extension. The latter arm pulling the thera band held by first arm down which aids in trunk

side bends . A minimum resistance is set initially for 2 weeks & then gradually increased by 40-50%

4.Lateral Band steps : ¹¹

Patient is instructed to stand wearing Theraband just above the knee with feet placed hip width apart ,with one foot stepping 12 inches laterally & again back to position ,maintaining equal distance as on the previous side instructed to do on the other side .For 1st 2 weeks Theraband is placed just above knee for rest 10 weeks instructed to wear at ankle .

5.One & One Quarter squats ¹¹

Patient is instructed to stand wearing Theraband just above the knee with feet placed shoulder width apart squat until knee is bent to 90 degrees . For 1st 2 weeks Theraband is placed just above knee for rest 10 weeks instructed to wear at ankle .

6.Single leg stands¹¹

Patient is instructed to sit on a high stool wearing Theraband just above the knees, bent to 90 degrees,asked to tilt torso forwards ,lift 1 foot off & balncing on the other asked to lift & stand up ,then to alternate with other leg . For 1st 2 weeks Theraband is placed just above knee for rest 10 weeks instructed to wear at ankle .

7.Standing -glut kick backs ¹¹

Patient is instructed to stand wearing Theraband just above the ankle ,engage core muscles,shift weight to one leg & with opposite leg slowly kick about 6-8 inches then tap the ground behind the planted foot .

8.Side lying leg lifts : ¹⁰

Journal of Coastal Life Medicine

Patient is instructed to lie on one side with knees straight ,supporting body weight on lower arm ,lifting upper leg towards ceiling as high as they can without hiking hip ,then instructed to lower it slowly .

9.Hip Bridges¹⁰

Patient is instructed to lie in crook lying position wearing Theraband just above the knee,engaging abdomen & squeezing glutei & lifting pelvis off the floor until reaching 90 degrees knees bend .

10.Clam shells¹¹

Patient is instructed to lie on one side with Thera band just above knee, fore arm supported , asked to abduct top leg towards ceiling as much they can .

10 repetitions of each exercise with 1-2 mins of rest intervals ,1 hour per day alternate 3 days in a week.

OUT COMES MEASURED

Fall Risk

TOOLS USED:

Timed up & go Test ³

Time taken for the person to raise from chair, walk 3 meters, turn around 180⁰, walk back to the chair& sit down turning 180⁰

Scored as Less than 10 secs -completely independent

Less than 20secs - independent for main transfers

Less than 30secs - Requires Assistance

(Adapted from Podsiadlo & Richardson, 1991)

Requires an Arm rest chair, stop watch

TOOL Validity:

Timed up & go Test ²

Duration for each patient:

1 hour per day alternate 3 days in a week for 3 months .

STUDY PERIOD

3 months for each patient.

STUDY SETTING:

Outpatient Department of Meenakshi Faculty of Physiotherapy,K.K.nagar,Chennai

DATA ANALYSIS METHODS

Paired t test is used to find the differences in Pre test & Post test values in Fall risk of diabetic patients ,formula being

Statistical Method used for this data: Paired t-test.

$$t = \frac{|d|}{s/\sqrt{n}}$$

Where d = Mean difference and s is the standard deviation of the difference and n is the total number

Data presentation

Resistance exercise with Thera band

Fall Risk		
S No	Pre test(secs)	Posttest(secs)
1.	18	15
2.	11	8
3.	15	12
4.	12	8
5.	21	15
6.	12	9

Journal of Coastal Life Medicine

7.	14	12
8.	22	12
9.	15	12
10.	21	14
11.	11	8
12.	12	10
13.	21	15
14.	14	12
15.	13	10
16.	20	15
17.	12	9
18.	18	12
19.	17	12
20.	15	12
21.	23	12
22.	16	12
23.	15	13
24.	16	12
25.	16	13
26.	19	15
27.	21	14
28.	17	12
29.	16	12
30.	12	9
31.	23	13
32.	15	12
33.	16	13
34.	17	12

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35.	25	14
36.	17	14
37.	17	14
38.	20	12
39.	19	13
40.	22	13
41.	16	12
42.	19	10
43.	20	14
44.	17	12
45.	14	12
46.	15	12
47.	13	12
48.	22	12
49.	18	12
50.	13	12
51.	17	13
52.	20	14
53.	15	14
54.	13	12
55.	12	10
56.	20	14
57.	11	9
58.	17	12
59.	18	13
60.	15	12
61.	24	15
62.	12	9

Journal of Coastal Life Medicine

63.	13	10
64.	21	12
65.	14	12
66.	12	9
67.	23	15
68.	14	12
69.	11	10
70.	12	9
71.	14	12
72.	21	13
73.	12	10
74.	14	12
75.	11	9
76.	18	10
77.	16	12
78.	22	15
79.	15	12
80.	12	10

Comparison of Pre-Test & Post Test Values of Fall Risk Using

Resistance exercise with Thera band(n =80)

Variables(secs)	Days	Mean	SD	t- value	Level of significance
Fall Risk	1	16.40	3.72	15.129	P< 0.001 & significant
	90	11.96	1.86		

GRAPHICAL REPRESENTATION



3. Data Analysis and Results

Resistance exercise with Thera band

Mean value of pre test is 16.40 and post test is 11.96. For 79 degrees of freedom and at 1% level of significance. The calculated value $t = 15.129$ is greater than the table value. Since the alternate hypothesis is accepted, there is reduction in Fall risk.

4. Discussion

Stolarczyk A et al (2021) concluded in the study "Balance and motion coordination parameters can be improved in patients with type 2 diabetes with physical balance training: non-randomized controlled trial." That there is a decreased balance and motor coordination and an increased risk of falling in patients with type 2 diabetes¹²

&Tessa riandini et al (2020) concluded in the study "Fall Risk and Balance Confidence in Patients With Diabetic Peripheral Neuropathy: An Observational Study." that Interventions targeting balance confidence may be beneficial in reducing the risk of falls in this diabetic population¹³

Results obtained shows that there is reduction in fall risk on using theraband exercises with which Balance component is improved Poor balance control and increased falling risk have also been reported in people with diabetic peripheral neuropathy (DPN). Postural control is improved with improved balance training

Diabetic Patients have increased risk of falling due to decreased proprioceptive feedback.¹²

5. Summary and Conclusion

During return to activity, improvement in Balance becomes a mystery which is utmost needed for Postural control in order to prevent falls. Physical therapy intervention of Resistance training with therabands is given to selected patients of 80 in a single group. Pre test, Post test scores are noted and analysis was done using paired-t-test. statistical analysis shows there is reduction in Fall risk. From this, it can be concluded that Resistance training with therabands can bring an early recovery of Type 2 Diabetes Mellitus patients where it improves proprioception & hence Balance components. Further, undergoing earlier management leads to better prognosis reducing their disablement and handicap in the society further enabling good interaction with others without fear of falling.

Limitations and Suggestions

1. This study measures reduction in Fall risk hence further study can be done measuring its impact on Quality of life
2. Longitudinal study could be opted where regular follow ups of the program can be under taken periodically & prevent fall risks.

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References

- [1] Albalawi H, Coulter E, Ghouri N, Paul L. The effectiveness of structured exercise in the south Asian population with type 2 diabetes: a systematic review. *The Physician and sports medicine*. 2017 Oct 2;45(4):408-17.
- [2] Jernigan SD, Pohl PS, Mahnken JD, Kluding PM. Diagnostic accuracy of fall risk assessment tools in people with diabetic peripheral neuropathy. *Physical therapy*. 2012 Nov 1;92(11):1461-70.
- [3] Zeltzer L, Bsc GZ. Timed Up and Go (TUG).
- [4] Kwon HR, Min KW, Ahn HJ, Seok HG, Lee JH, Park GS, Han KA. Effects of aerobic exercise vs. resistance training on endothelial function in women with type 2 diabetes mellitus. *Diabetes & metabolism journal*. 2011 Aug 31;35(4):364-73.
- [5] Supriya R, Singh KP, Gao Y, Gu Y, Baker JS. Effect of Exercise on Secondary Sarcopenia: A Comprehensive Literature Review. *Biology*. 2021 Dec 30;11(1):51.
- [6] Gu Y, Dennis SM. Are falls prevention programs effective at reducing the risk factors for falls in people with type-2 diabetes mellitus and peripheral neuropathy: a systematic review with narrative synthesis. *Journal of Diabetes and its Complications*. 2017 Feb 1;31(2):504-16.
- [7] Morrison S, Colberg SR, Parson HK, Vinik AI. Exercise improves gait, reaction time and postural stability in older adults with type 2 diabetes and neuropathy. *Journal of Diabetes and its Complications*. 2014 Sep 1;28(5):715-22.
- [8] Chapman A, Meyer C, Renehan E, Hill KD, Browning CJ. Exercise interventions for the improvement of falls-related outcomes among older adults with diabetes mellitus: a systematic review and meta-analyses. *Journal of Diabetes and its Complications*. 2017 Mar 1;31(3):631-45.
- [9] Perell KL, Nelson A, Goldman RL, Luther SL, Prieto-Lewis N, Rubenstein LZ. Fall risk assessment measures: an analytic review. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*. 2001 Dec 1;56(12):M761-6.
- [10] Choi K, Bak J, Cho M, Chung Y. The effects of performing a one-legged bridge with hip abduction and use of a sling on trunk and lower extremity muscle activation in healthy adults. *Journal of physical therapy science*. 2016;28(9):2625-8.
- [11] Ebert JR, Edwards PK, Fick DP, Janes GC. A systematic review of rehabilitation exercises to progressively load the gluteus medius. *Journal of Sport Rehabilitation*. 2017 Sep 1;26(5):418-36.
- [12] Stolarczyk A, Jarzowski I, Maciąg BM, Radzimowski K, Świercz M, Stolarczyk M. Balance and motion coordination parameters can be improved in patients with type 2 diabetes with physical balance training: non-randomized controlled trial. *BMC Endocrine Disorders*. 2021 Dec;21(1):1-9.
- [13] Riandini T, Khoo EY, Tai BC, Tavintharan S, Phua MS, Chandran K, Hwang SW, Venkataraman K. Fall risk and balance confidence in patients with diabetic peripheral neuropathy: an observational study. *Frontiers in endocrinology*. 2020 Oct 23;11:573804.