Effectiveness of 15 Minutes' Walk with 15 Minutes Ankle Toe Movement to Reduce Random Blood Sugar Level in Type 2 Diabetes Adults with Associate Problems - An Experimental Study

Shanthoshraja.Y[1], Rubeskumar.M[2], Silambarasan.M[3], Charles.S[4], Subramani.A[5]

[1]HOD cum MD, [2]HOD, [3]Tutor cum Physiotherapist, [4]Associate Professor, [5]Physical Therapist
[1]Shamadeva Physio Care - A Unit of Interactive Physio E Learning, Vennandur – 637505
[2]MRV Advance Physiotherapy, Andipatti, Theni District
[3,4]Sri Ramakrishna Institute of Paramedical Sciences, College of Physiotherapy, Coimbatore
[5]RGH, Regina,SK, Canada

ABSTRACT

Background: Diabetes is one of the hormonal disorders that related to Insulin. Diabetes is a state of high blood sugar level in blood. And otherwise called Diabetes Mellitus. Diabetes is mainly classified into two types. One is Type 1 Diabetes and another one is Type 2 Diabetes. During the physical activities our body get energy from glucose metabolism that is C6H12O6 burn with O2 and gives H2O, CO2 & Energy that needed to body in every cells.

Aim & Objective: To find out the effectiveness of 15 minutes' walk with 15 minutes ankle toe movement to reduce random blood sugar level in type 2 diabetes adults with associate problems.

Methodology: 30 subjects of age group 25- 45 years were selected, who fulfilled the inclusion Criteria. Out of the 50 patients 30 subjects who were type 2 diabetes and also those who find by Random Blood Sugar (RBS) level between 250 – 300 mg/dl & scored between 25 – 30 in BMI. 30 subjects who selected were treated 15 minutes' walk with 15 minutes ankle toe movement two times in a day for a period of 24 weeks. The pre-test and post-test measurement was taken by using of Digital Glucometer (Accu-Chek Active).

Result: The pre-test and post-test mean values of RBS level was analyzed using the paired 't' test. For 29 degrees of freedom and 5% level of significance, the table's' value is 1.699 and calculated 't' value 49.9. Since the calculated' value was greater than table's' value null hypothesis is rejected.

Conclusion: This study it can be concluded that 15 minutes' walk with 15 minutes ankle toe movement for a period of 24 weeks to reduced random blood sugar level in type 2 Diabetes adults with associate problems.

Keywords: Diabetes, Type 2 Diabetes, RBS, Walk, Ankle Toe Movement, Adults, Associate Problems

Introduction

Diabetes is one of the hormonal disorders that related to Insulin. Diabetes is a state of high blood sugar level in blood and otherwise called Diabetes Mellitus. Diabetes is mainly classified into two types. One is Type 1Diabetes and another one is Type 2 Diabetes. As per WHO & ICMR statement, In India almost 10 crore people affected by Type 2 Diabetes (May the subjects variable depend upon current status). In Tamil Nadu 10% of population affected by Type 2 Diabetes in 7.7 crore. The Glucose metabolism is controlling by Insulin also. If any affecting of release or utilization of insulin into the cells. Its leads to high blood sugar level in blood. During the physical activities our body get energy from glucose metabolism that is C6H12O6 burn with O2 and gives H2O, CO2 & Energy that needed to body in every cells. If We are doing the Physical activities regularly, its maintain or reduce blood sugar significantly. Since the second month of 2023, I am exploring type 2 diabetes physiotherapy treatment. I have described three types of studies in it till now. This is my second study. Hence this physiotherapy study is called SRY Physio Protocol II by our fellowships.

Methodology

A total number of thirty subjects were selected from Tamil Nadu state in India by purposive sampling method by who fulfilled the inclusion criteria. The study was pretest and post-test for a single group experimental study in nature. The treatment was conducted for a period of 24 weeks. The subject was selected by using purposive sampling method. Pretest taken using RBS level considered and assigned to 15 minutes walk with 15 minutes ankle toe movement two times in a day. The Inclusion Criteria are The patients age between 25 – 45 years, Only adult patients have selected in this study, The subjects should followed the South Indian food style with 2000 to 2500 kcal or food calories per day that monitored by Samsang Health App, 25 – 30 score in BMI and 250 - 300 mg/dl in RBS level. And selected if the patients suffering from complications of Type 2 Diabetes also. Like Peripheral neuritis, Optic neuritis and all. The Exclusion Criteria are the score above 30 in BMI and above 300 mg/dl in RBS level, Uncooperative patients and other pathological, OA, RA, Cardio Pulmonary problems. Before the patient treatment all the subjects were explained about the study and the procedure to be applied. They were asked to inform if they any discomfort during the course of study. Written consent was obtained from the subjects**.**

Procedure: The person is made to stand on weight scale for measuring weight. And take height measurement by stadiometer on same time. Then calculated the BMI score by using of digital calculator. The BMI score should be 25 – 30. And RBS level should be find by using Digital Glucometer (Accu-Chek Active) before starting the study. The exercise program for all days of 24 weeks. Same measurement taken after twenty four weeks exercise program for RBS level in type 2 Diabetes adults.

15 Minutes' Walk: All subjects should check vital signs before starting program. Only stable persons should involve in to our study. The duration of walks is monitoring by stop watch. And all subject must involve the program for twenty four weeks. Everyday all subjects must check their vital before and after exercise program. If anything, immediately the subject should be hospitalized.
After completed the 15 minutes' walk all subjects should take rest for 5 Minutes.
Repeats: 2 Times in a day (Morning once & Evening Once)

15 Minutes Ankle toe Movement: All subjects are made to lying on bed and check vital signs before and after exercise in everyday. All should be normal.
Patient Position: Relaxed Supine Lying
Duration: 15 Minutes
Repeats: 2 Times in a day (Morning Once & Evening Once)

Data Analysis

RBS Level: The pretest and posttest mean values of RBS level was analyzed using the paired 't' test. For 29 degrees of freedom and 5% level of significance, the table 't' value is 1.699 and calculated 't' value 49.9 Since the calculated 't' value was greater than table 't' value null hypothesis is rejected.

Mean values (mg/dl)		**Calculated**	**Table**	**Level of**
Pre test	**Post test**	**'t' value**	**'t' value**	**Significance**
273	**134**	**49.9**	**1.699 (one-tail)**	**P < 0.05 Significant**

Result

This study was conducted on 30 subjects. To find out type 2 Diabetes was used by RBS level and used was short version. The pretest and posttest mean values of RBS level was analyzed using the paired 't' test. Since the calculated 't' value was greater than table t' value null hypothesis is rejected. The overall result of this study is 15 minutes walk with 15 minutes ankle toe movement two times in a day for a period of 24 weeks to reduce RBS level in type 2 Diabetes Adults with associate problems.

Discussion

All subjects are taking South Indian diets and 2000 - 2500 kilo calories every day. They are from Namakkal District and followed South Indian food style. The efficacy of 15 minutes walk with 15 minutes ankle to movement two times in a day to utilized calories for muscle action from body. Approximately 350 to 550 Kcal or food calories burned every day the result of protocol that calculated by Samsang Health App.

Outcome measures included the RBS level find by Digital Glucometer (Accu-Chek Active) which was measured prior to treatment (pretest) and at the end of 24 weeks of treatment (posttest). In this study aim was to find out the effectiveness of 15 minutes walk with 15 minutes ankle toe movement two times in a day to reduce random blood sugar level in type 2 diabetes adults with associate problems. The overall effectiveness on RBS level was analyzed by paired 't' test after 24 weeks treatment which shows $p < 0.05$ which is significant.

From this study it can be concluded after the exercises program the RBS level is reduced followed by 24 weeks among type 2 Diabetes adults with associate problems.

Conclusion:

The aim of study is found out the effectiveness of 15minutes walk with 15 minutes ankle toe movement two time in a day to reduce random blood sugar level in type 2 Diabetes adults with associate problems. 50 numbers of type 2 Diabetes adults were selected and assessed. Those who had BMI score between 25 – 30 and RBS level between 250-300 mg/dl. Out of 50 members 30 subjects were selected. They received the exercise program.

The BMI score and RBS level was measured before and after treatment session (24 weeks). Pretest and posttest values of the study was collected and assessed for significant difference and their results were analyzed by using paired 't' test.

This study concluded that 15 minutes walk with 15 minutes ankle toe movement two times in a day to reduce random blood sugar level in type 2 diabetes adults with associate problems**.**

Bibliography:

1. Figueira, F. R., Umpierre, D., Bock, P. M., Waclawovsky, G., Guerra, A. P., Donelli, A., ... & Schaan, B. D. (2019). Effect of exercise on glucose variability in healthy subjects: randomized crossover trial. Biology of Sport, 36(2), 141. 10.5114/biolsport.2019.83006
2. Karstoft, K., Winding, K., Knudsen, S. H., Nielsen, J. S., Thomsen, C., Pedersen, B. K., & Solomon, T. P. (2013). The effects of free-living interval-walking training on glycemic control, body composition, and physical fitness in type 2 diabetic patients: a randomized, controlled trial. Diabetes care, 36(2), 228–236. https://doi.org/10.2337/dc12-0658
3. Mutrie, N., & Hannah, M. K. (2004). Some work hard while others play hard: The achievement of current recommendations for physical activity levels at work, at home, and in leisure time in the West of Scotland. International Journal of Health Promotion and Education, 42(4), 109–117. https://doi.org/10.1080/14635240.2004.10708024
4. ai, L. W., Li, T. C., Hwu, Y. J., Chang, S. C., Chen, L. L., & Chang, P. Y. (2016). The effectiveness of regular leisure-time physical activities on long-term glycemic control in people with type 2 diabetes: A systematic review and meta-analysis. Diabetes Research and Clinical Practice, 113(91), 77–85. https://doi.org/10.1016/j.diabres.2016.01.011
5. Praet, S. F., van Rooij, E. S., Wijtvliet, A., Boonman-de Winter, L. J., Enneking, T., Kuipers, H., Stehouwer, C. D., & van Loon, L. J. (2008). Brisk walking compared with an individualised medical fitness programme for patients with type 2 diabetes: a randomised controlled trial. Diabetologia, 51(5), 736–746. https://doi.org/10.1007/s00125-008-0950-y
6. Cox DJ, Banton T, Moncrief M, Conaway M, Diamond A, Holmes V, Green Pastors J, et al. (2020). Glycemic excursion minimization in the management of type 2 diabetes: A novel intervention tested in a randomized clinical trial, BMJ Open Diabetes Res Care. 8(2). DOI: 10.1136/bmjdrc-2020-001795.
7. Duvivier BMFM, Schaper NC, Hesselink MKC, van Kan L, Stienen N, Winkens B, Koster A, et al. (2017). Breaking sitting with light activities vs structured exercise: a randomised crossover study demonstrating benefits for glycaemic control and insulin Li X, Si H, Chen Y, Li S, Yin N, Wang Z

(2020). Effects of fitness qigong and tai chi on middle-aged and elderly patients with type 2 diabetes mellitus. PLoS One, 15(12). DOI: 10.1371/journal.pone.0243989.

8. Metcalfe RS, Fitzpatrick B, Fitzpatrick S, McDermott G, Brick N, McClean C, and Davison GW (2018). Extremely short duration interval exercise improves 24-h glycaemia in men with type 2 diabetes, Eur. J. Appl. Physiol. 118(12): 2551–2562. doi: 10.1007/s00-421-018-3980-2.
9. Temple KA, Tjaden AH, Atkinson KM, Barengolts E, Hannon TS, Mather KJ, Utzschneider KM, et al. (2019). Association of habitual daily physical acti-vity with glucose tolerance and B-cell function in adults with impaired glucose tolerance or recently diagnosed type 2 diabetes from the Restoring Insulin Secretion (RISE) study. Diabetes Care, 42(8): 1521–1529. doi: 10.2337/dc19-0538.
10. Colberg, S. R., Sigal, R. J., Yardley, J. E., Riddell, M. C., Dunstan, D. W., Dempsey, P. C., Horton, E. S., Castorino, K., & Tate, D. F. (2016). Physical Activity/Exercise and Diabetes: A Position Statement of the American Diabetes Association. Diabetes care, 39(11), 2065–2079. https://doi.org/10.2337/dc16-1728 DOI: https://doi.org/10.2337/dc16-1728
11. Hegazi, R., El-Gamal, M., Abdel-Hady, N., & Hamdy, O. (2016). Epidemiology of and Risk Factors for Type 2 Diabetes in Egypt. In Annals of Global Health (Vol. 81, Issue 6, p. 814). Ubiquity Press, Ltd. https://doi.org/10.1016/j.aogh.2015.12.011 DOI: https://doi.org/10.1016/j.aogh.2015.12.011
12. ylow, L., Kleinert, M., Richter, E. A., & Jensen, T. E. (2016). Exercise-stimulated glucose uptake regulation and implications for glycaemic control. In Nature Reviews Endocrinology (Vol. 13, Issue 3, pp. 133–148). Springer Science and Business Media LLC. https://doi.org/10.1038/nrendo.2016.162 DOI: https://doi.org/10.1038/nrendo.2016.162
13. Park JJ, Kim HJ. Effects of combined treatment of aerobic exercise and resistance exercise on hemoglobin A1c, blood lipids, bone mineral content in patients with type II diabetes mellitus. J Korean Soc Living Environ Syst 2015;22:722-9.
14. Hwang AR, Yoo JS, Kim CJ. The effects of planned exercise program on metabolism, cardiopulmonary function and exercise compliance in type 2 diabetes mellitus patients. J Korean Acad Nurs 2001;31:20-30
15. An KH, Min KW, Han KA. The effects of aerobic training versus resistance training in non-obese type 2 diabetics. J Korean Diabetes Assoc 2005;29:486-94.
16. Snowling NJ, Hopkins WG. Effects of different modes of exercise training on glucose control and risk factors for complications in type 2 diabetic patients: a meta-analysis. Diabetes Care 2006;29:2518-27
17. Nielsen AB, de Fine Olivarius N, Gannik D, Hindsberger C, Hollnagel H. Structured personal diabetes care in primary health care affects only women's HbA1c. Diabetes Care 2006; 29:963-9.
18. Chudyk A, Petrella RJ. Effects of exercise on cardiovascular risk factors in type 2 diabetes: a meta-analysis. Diabetes Care 2011; 34:1228-37.
19. Choi PB. Effects and correlation analysis of long-term exercise on diabetes indicators, lipid profile, and pancreatic cancer factor in the elderly with type 2 diabetes mellitus. Korean J Exerc Rehabil 2012;8:93-102.
20. https://www.who.int/news-room/fact-sheets/detail/diabetes
21. https://en.wikipedia.org/wiki/Type_2_diabetes
22. "Providers of the Diabetes Prevention Programme need to be more consistent, and offer flexibility and equality of access". NIHR Evidence (Plain English summary). National Institute for Health and Care Research. 13 September 2021. doi:10.3310/alert_47416.
23. Howarth E, Bower PJ, Kontopantelis E, Soiland-Reyes C, Meacock R, Whittaker W, Cotterill S (December 2020). "'Going the distance': an independent cohort study of engagement and dropout among the first 100 000 referrals into a large-scale diabetes prevention program". BMJ Open Diabetes Research & Care. 8 (2): e001835. doi:10.1136/bmjdrc-2020-001835. PMC 7733095. PMID 33303493.
24. Shanthoshraja.Y,Krishnaveni.T,Fernandez Franklin.A (August-2024) "45 MINUTES WALK WITH 15 MINUTES ANKLE TOE MOVEMENT TO REDUCE RANDOM BLOOD SUGAR LEVEL IN TYPE 2 DIABETES ADULTS" . https://www.ijsdr.org/viewpaperforall.php?paper=IJSDR2408022